



# Box Hill Central North Masterplan

## Transport Impact Assessment

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21/06/2022

**PREPARED FOR:**

Vicinity Centres

**Ref:** 301401289

**PREPARED BY:**

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**Quality Record**

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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# EXECUTIVE SUMMARY

A masterplan has been prepared by Bates Smart for Vicinity Centres for the redevelopment of Box Hill Central North. The masterplan entails the demolition of the existing retail floor area and associated car parking on the site to create seven separate development lots, a new road network and associated laneways.

In the context of the existing site, the masterplan for Box Hill Central North has been developed with an approach that:

1. Prioritises walking and cycling through the precinct.
2. Enhances connectivity to surrounding public transport services, both for the residents / employees / visitors of the precinct itself and the broader community in the surrounding area.
3. Creates an improved public realm within the precinct, including the provision of a new street network through the site (extension of Prospect Street and Clisby Court) and two new parks which accommodate the diverse needs to all users.
4. Limits the provision of car parking (as far as commercially practicable) to proactively reduce traffic impacts of the development of the site and encourage the use of active and public transport.

For the Box Hill Central North precinct, the overarching implication of adopting this framework is that the design of the new internal street proposed in the masterplan should focus on the optimisation of the street as a place where people are likely to dwell, with traffic movement being subservient. In this scenario, congestion on the street should not be seen as a “problem to solve” at the expense of the place or the movement of people, but rather an acceptable outcome that may act to discourage vehicle traffic and maximise the amenity of the street as a place.

The masterplan proposes to accommodate these additional trips, and improve the overall liveability of the precinct and the Box Hill MAC, by completion of the following responses:

- **Walking & Cycling Responses:**

- The creation of a new street network through to link Prospect Street and Clisby Court, which includes road works at the Whitehorse Road / Clisby Court and Nelson Road / Prospect Street intersections to improve their safety.
- The extension of Main Street to the new street network to improve pedestrian connectivity to, from and through the site for the benefit of the Box Hill MAC and surrounding destinations like Box Hill Hospital and Box Hill Institute of TAFE.
- The closure of Fairbank Lane to the immediate north of the Box Hill Central site to extend the parklet located adjacent Whitehorse Road.
- The provision of area to facilitate ability for Council to incorporate future cycle and pedestrian link over the train line along the western edge of the site.
- The provision of bicycle parking infrastructure which will exceed statutory requirements.

- **Public Transport Responses:**

- The provision of improved pedestrian connections through the site from its development and the surrounding area to the train station. (The public transport accessibility of this train station is also to be enhanced by the proposed Suburban Rail Loop project).
- The provision of car parking at rates well below statutory requirements as a proactive means to reduce traffic impacts by encouraging the use of public transport.
- The commitment to other “soft measures”, such as Green Travel Plans for each development and enhanced wayfinding signage within the new public realm.

- **Traffic (& Car Parking) Responses**

- The adoption of site-specific maximum car parking rates to proactively reduce traffic impacts and thereby result in a traffic deintensification of the site. The recommended rates are:
  - Residential:
    - One-bedroom apartments: 1 resident car space per apartment
    - Two-bedroom apartments: 1 resident car space per apartment
    - Three-bedroom apartments: 2 resident car spaces per apartment
    - Visitors: 0.1 visitor car spaces per apartment
  - Office: 2 car spaces per 100sqm NFA
  - Shop: 3.5 car spaces per 100sqm NLA
- The introduction of service laneways to provide vehicle access to development lots (as far as practicable) to minimise crossovers onto Prospect Street.
- The potential to implement other measures as recommended in the Box Hill ITS with future stages of development

These responses can be expected to safely and efficiently accommodate the anticipated trip generation of the development of the precinct and enable enhanced connections to the Box Hill MAC, the Box Hill Train Station and surrounding land uses like Box Hill Hospital and Box Hill Institute of TAFE.

It is noted that the responses are also consistent with the overarching themes and recommendations of the Box Hill ITS which speaks to the allocation of road space to more efficient and sustainable modes of transport, providing a safe and secure transport network, providing accessible and integrated walking, cycling and public transport networks.

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# 1 Introduction

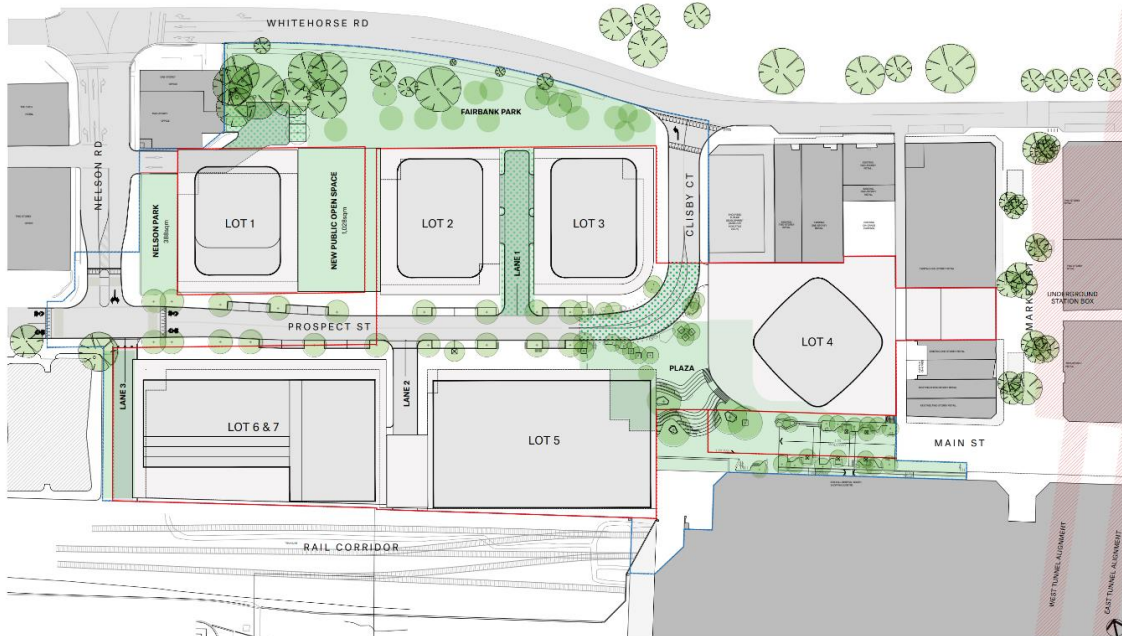
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## 1.1 BACKGROUND & PROPOSAL

A masterplan has been prepared by Bates Smart for Vicinity Centres for the redevelopment of Box Hill Central North. The masterplan entails the demolition of the existing retail floor area and associated car parking on the site to create seven separate development lots. The layout of the masterplan is shown in Figure 1.1, with the indicative land use summary outlined in Table 1.1.

**Figure 1.1: Masterplan Layout (Masterplan Report, Bate Smart)**



**Table 1.1: Development Summary**

Lot	Predominate Land Use	Residential GFA	Commercial NLA	Retail GLAR	Approx. Car Park Yield
Lot 1	Residential	25,160sqm	3,419sqm	564sqm	222 spaces
Lot 2	Residential	34,000sqm	3,572sqm	505sqm	222 spaces
Lot 3	Residential	37,420sqm	3,461sqm	534sqm	221 spaces
Lot 4	Residential	37,253sqm	7,615sqm	865sqm	224 spaces
Lot 5	Office	-	40,963sqm	1,317sqm	202 spaces
Lot 6&7	Residential	38,530sqm	6,926sqm	494sqm	307 spaces
<b>Total</b>		<b>172,363 sqm (approx. 1,750 apartments)</b>	<b>69,956sqm</b>	<b>4,279sqm</b>	<b>1,398 spaces</b>

A previous masterplan was prepared and submitted to Department of Environment, Land, Water and Planning (DELWP) for this site in 2020 for which Stantec (then GTA) prepared a Transport Impact Assessment. This masterplan received feedback from Council and other parties which led to this resubmission. This revised masterplan considers that feedback and now includes the following changes from the original submission:

- Combining of access points to Lots 6 and 7 and the closing of Lane 3 (Lane 4 in the previous submission) to vehicular traffic.
- Relocation of the access to Lot 3 away from Clisby Court to Lane 1.
- Replacement of the Prospect Street / Nelson Road roundabout with a raised T-intersection to improve pedestrian and cyclist safety and priority. This can be achieved due to the closure of Lane 3 to vehicular traffic (it is noted that this intersection treatment is more consistent with the actions and intentions of the ITS).





- Narrowing of the road width at Clisby Court near Whitehorse Road to provide additional footpath/landscaping (this could be achieved due to the relocated access to Lot 3).
- The introduction of “Fairbank Park Extension”, an area of additional public open space between Lots 1 and 2.
- Localised widening of the bend between Clisby Court and Prospect Street to achieve safer heavy vehicle movements through the bend.

The proposed land uses and the yields of each lot are generally consistent with the original submission.

## 1.2 PURPOSE & STRUCTURE OF THIS REPORT

The report sets out a high-level assessment of the transport impacts of the proposed development envisaged in the masterplan including the key transport responses / design attributes that have informed the masterplan. It considers:

- The existing conditions pursuant the transport network in the vicinity of the site and any relevant transport or planning policy relevant to the site – **refer to Section 2**
- The design principles that have informed the development of the masterplan including a review of its consistency with contemporary Movement and Place theory– **refer to Section 3**
- The expected trip generation of the proposed development and the proposed transport response to best accommodate these trips on the surrounding transport network – **refer to Section 4**
- The details of the proposed transport response with respect to each relevant transport mode / consideration, such as:
  - Walking & Cycling – **refer to Section 5**
  - Public transport – **refer to Section 6**
  - Traffic (& car parking) – **refer to Section 7**

This transport impact assessment is strategic in nature and has been prepared in support of the masterplan, which forms the basis of the planning scheme amendment for the precinct. Future detailed development plans, including transport assessments as required, for each stage of the master plan will be informed by this TIA and will be required to demonstrated that they are generally consistent with the master plan.

## 1.3 REFERENCES

In preparing this report, reference has been made to the following:

- Whitehorse Planning Scheme
- plans for the proposed Masterplan prepared by Bates Smart
- Public Realm Master Plan prepared by Lat27
- Australian Standard / New Zealand Standard, Parking Facilities (AS2890)
- Box Hill MAC Integrated Transport Strategy, Whitehorse City Council, adopted September 2020
- traffic and car parking surveys undertaken by Stantec as referenced in the context of this report
- other documents as referenced throughout the report



## 2 Existing Conditions

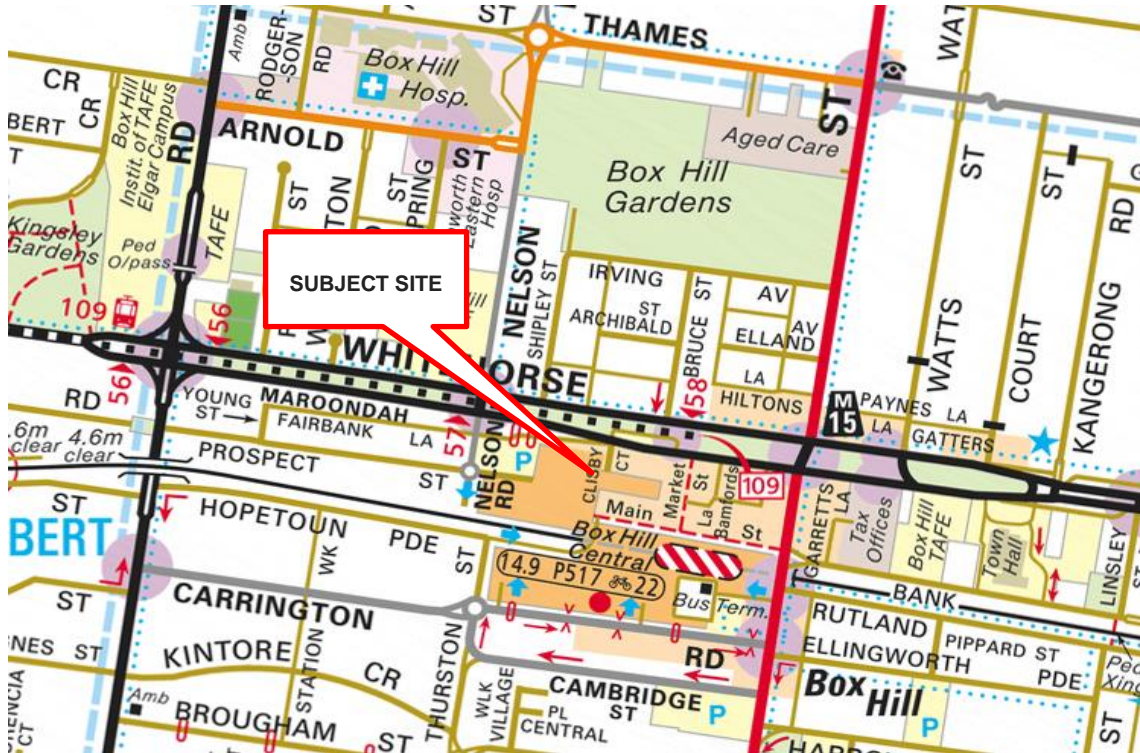
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## 2.1 LOCATION

Box Hill Central North is located at 17-21 Market Street in Box Hill adjacent Whitehorse Road within a Commercial 1 Zone (CZ1) and within the Box Hill Major Activity Centre. The site is currently occupied by a retail and car parking land use. The location of the site and the surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject Site and Environs



## 2.2 EXISTING LAND USES

The Box Hill Central North Shopping Centre provides a total of 882 car spaces (including car parking on the site and immediately adjacent to it) and approximately 14,599sqm of retail floor area.

## 2.3 ACTIVE TRAVEL NETWORK

### 2.3.1 PEDESTRIAN NETWORK

The Box Hill area generally enjoys a well-connected pedestrian network, with all streets in the local area having sealed footpaths and streetlighting.

However, it is noted that there are significant barriers to pedestrian movement at present, particularly the rail reserve and Whitehorse Road, and the existing built form of Box Hill Central North itself. These barriers limit the ease in which future north-south and east-west connections can be provided.

Box Hill train station, tram terminus and bus stations are approximately 250m walking distance from the site. Pedestrians can access the stations by either travelling along Prospect Street, Whitehorse Road, or Market street, through the multi-deck car parking area, or through the Box Hill Central North shopping centre as a shortcut.

### 2.3.2 CYCLING NETWORK

There is currently limited cycling infrastructure around Box Hill, particularly for north-south routes.



Whitehorse Road, which provides access east-west, carries high traffic volumes and is dominated by vehicle movements. Station Street aligned north-south, has narrow traffic lane widths and is unattractive for cyclists for this reason.

The cycle infrastructure currently in place includes:

- From the east, there is a shared path running along the north side of the rail line which connects with the Box Hill to Ringwood Bicycle Path.
- From the west, there is an on-road cycle lane on Mont Albert Road.
- From the south, there is a shared path running along the eastern side of Surrey Park which then connects to Thurston Street where there is a mix of on-road cycle lanes and 'sharrows'.

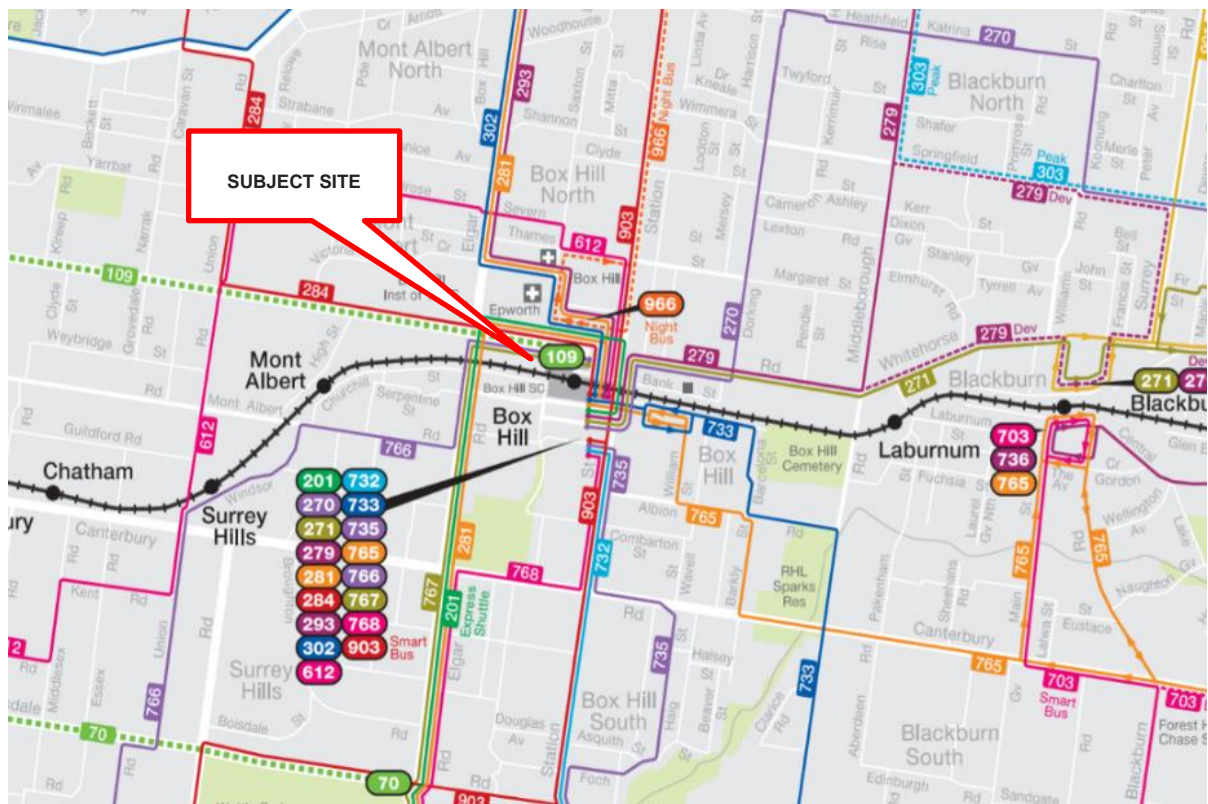
### 2.3.3 PUBLIC TRANSPORT NETWORK

Box Hill has excellent access to and is well serviced by public transport as shown in Figure 2.2 and highlights that existing public transport services in the vicinity of the site include:

- Heavy rail, with trains running to the CBD at a frequency of approx. 3.5 minutes (with a journey time of approx. 15-30 minutes) during peak periods.
- Bus services, including 16 bus routes, operating from the central bus interchange located on the existing roof of the Box Hill Central South Shopping Centre.
- Tram services, being route 109 on Whitehorse Road.

The excellent access to public transport is evident in the travel times catchments as detailed in Figure 2.15. The catchment in the east-west direction is significant, with Melbourne CBD being within a 30-mins (approx.) journey. The north-south catchment is still considered large for suburban Melbourne but is less extensive than the east-west direction as it relies heavily on the bus network. The north-south catchment is expected greatly increase as a result of the Suburban Rail Loop.

**Figure 2.2: Existing Public Transport Network**



## 2.4 ROAD NETWORK

### 2.4.1 NEARBY ROADS

The key roads in the vicinity of the site include Whitehorse Road to the north, Prospect Street and Nelson Road to the west and Clisby Court to the north. The key characteristics of these roads, together with their daily traffic volume levels, is discussed below.

#### 2.4.1.1 Whitehorse Road

Whitehorse Road functions as a primary state arterial road and is located in a Road Zone (Category 1).

It is a two-way road aligned in an east-west direction and configured with a 4-lane, 20+ metre wide carriageway set within a 30 to 60 metre road reserve (approx.). Kerbside car parking is generally not permitted, although there are sections of parallel parking provided near shop front doors.

Whitehorse Road carries approximately 30,000 vehicles per day and is shown in Figure 2.3 and Figure 2.4.

Figure 2.3: Whitehorse Road (Looking East)



Figure 2.4: Whitehorse Road (Looking West)



#### 2.4.1.2 Prospect Street

Prospect Street functions as a local traffic street road.

It is a two-way road aligned in an east-west direction and configured with a 2-lane, 9.4 metre wide carriageway set within a 15 metre road reserve (approx.). Kerbside loading zone parking for is permitted on the north side of the road. Prospect Street is shown in Figure 2.5 and Figure 2.6.

It is noted that Prospect Street terminates at the site at its eastern end at a small “court bowl”. It also provides vehicle access to car parking within Box Hill Central North.

**Figure 2.5: Prospect Street (Looking East)**



**Figure 2.6: Prospect Street (Looking West)**



### **2.4.1.3 Nelson Road**

Nelson Road functions as a collector road.

It is a two-way road aligned in a north-south direction and configured with a 2-lane, 14 metre wide carriageway set within a 20 metre road reserve (approx.). Kerbside parking is not permitted along its length south of Whitehorse Road.

Nelson Road (south of Whitehorse Road) carries approximately 8,000 vehicles per day and is shown in Figure 2.7 and Figure 2.8.

**Figure 2.7: Nelson Road (looking North)**



**Figure 2.8: Nelson Road (looking South)**



### **2.4.1.4 Clisby Court**

Clisby Court functions as a local street. It is a two-way dead end road aligned in a north-south direction and configured with a 2-lane, 9 metre wide carriageway set within a 15 metre wide road reserve (approx.). The primary utilisation of the road is to access loading. Kerbside parking is not permitted.

## **2.4.2 TRAFFIC VOLUMES ON ABUTTING ROADS**

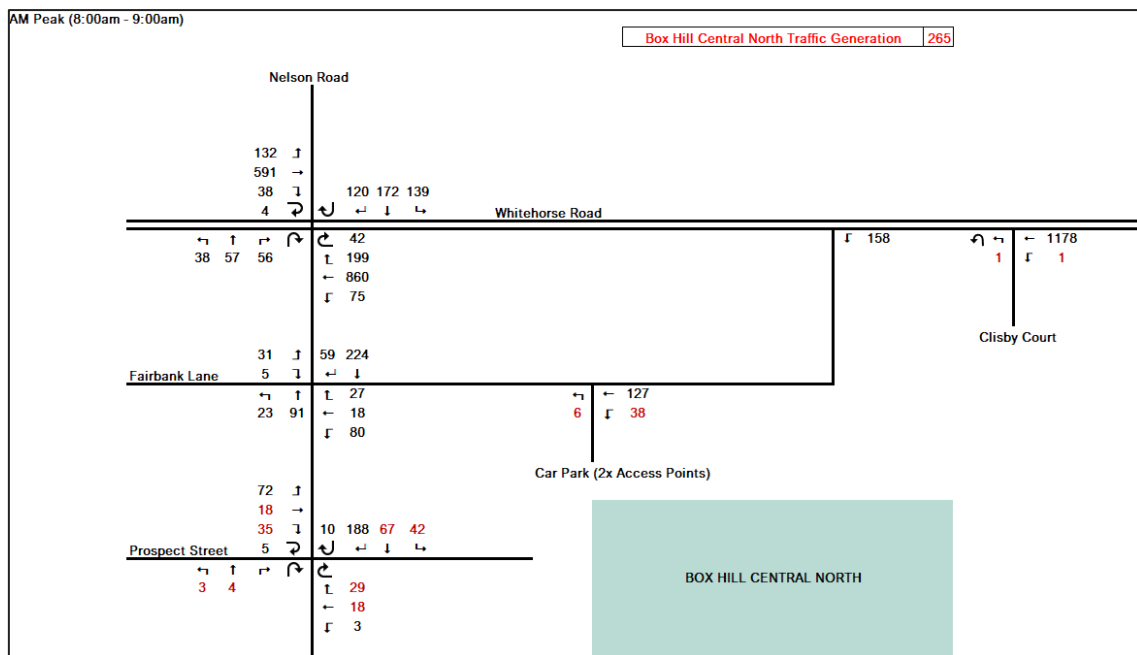
Transport surveys were undertaken in the vicinity of Box Hill Central North on Thursday 13<sup>th</sup> and Saturday 15<sup>th</sup> December 2018. As part of the revised masterplan work, SCATS traffic volume history data was analysed at Whitehorse Road / Nelson Road from 2<sup>nd</sup> to 8<sup>th</sup> May 2022. The analysis found that the traffic volumes from the 2018 survey were higher than the 2022 SCATS data by about 10%. The potential reasons for this include COVID-affected reduced travel demands and/or the 2018 traffic surveys were taken in late December which typically generate higher retail trade. For conservatism, the 2018 traffic survey data was

taken as the base volumes on the network. The traffic survey data for the AM, PM and Saturday lunchtime peaks are summarised in Figure 2.9 to Figure 2.11.

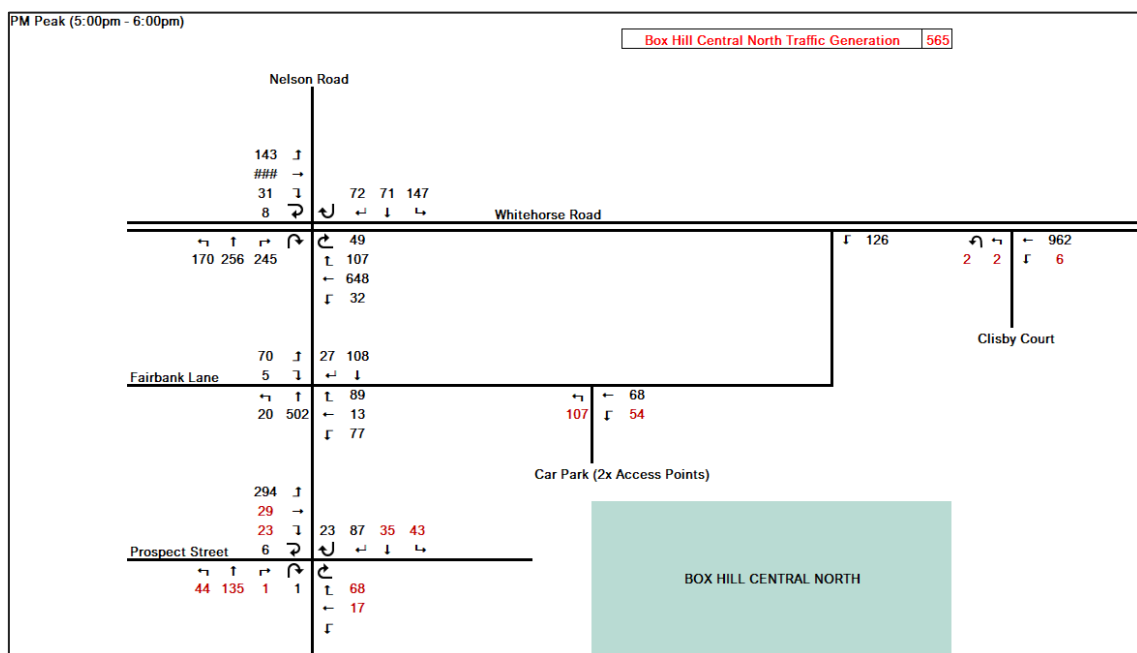
The traffic volumes to and from the Box Hill Central North car parks are:

- Weekday AM Peak Hour: 265 vehicle movements per hour (or 0.30 vehicle movements per hour per car space).
- Weekday PM Peak Hour: 565 vehicle movements per hour (or 0.64 vehicle movements per hour per car space).
- Saturday Lunchtime Peak Hour: 806 vehicle movements per hour (or 0.91 vehicle movements per hour per car space).

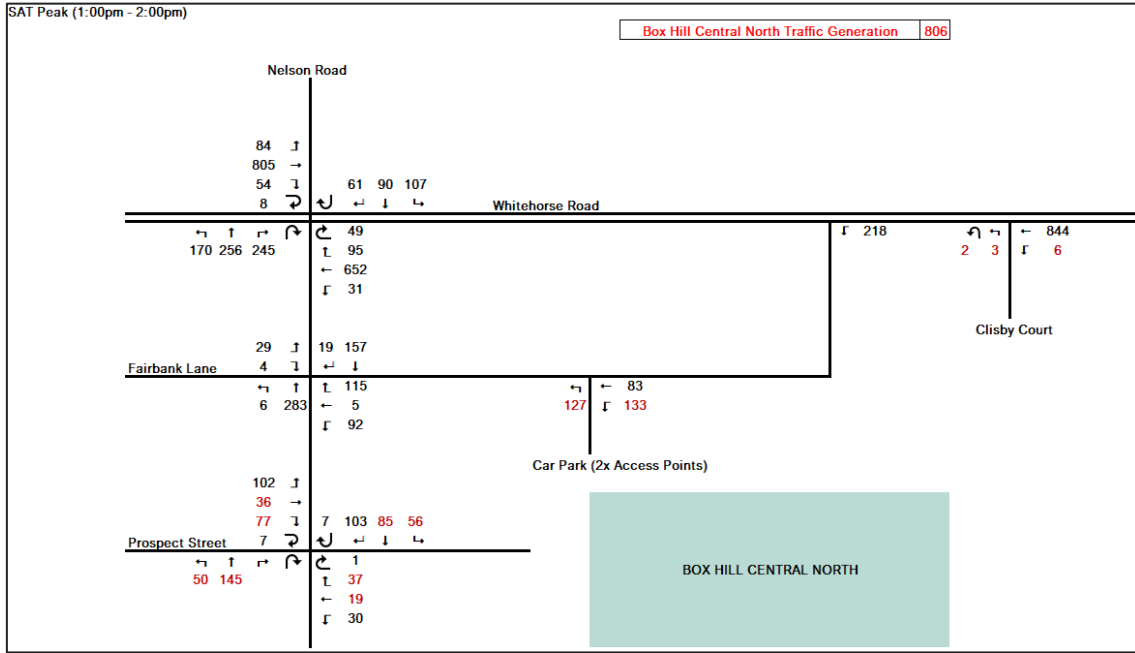
**Figure 2.9: Weekday AM Traffic Volumes**



**Figure 2.10: Weekday PM Traffic Volumes**



**Figure 2.11: Saturday Lunchtime Traffic Volumes**



## 2.5 CATCHMENT MAPPING

To assess the accessibility of the MAC in comparison to other activity centres, Stantec has extracted and reviewed additional data to compare the actual population of residents and office workers living within a 30-minute car and 45-minute public transport journey of Box Hill (and other suburbs)<sup>1</sup>.

This data has been extracted using a combination of open source, HERE and ABS data, with the catchments measured from an approximate midpoint of the suburbs (e.g. for South Yarra, the data is measured from the Chapel Street / Toorak Road intersection). The available catchments and resultant data is summarised in Figure 2.12, Figure 2.13, Figure 2.14 and Figure 2.15 with key findings including:

- Box Hill has a lesser population living within a 30-minute car journey catchment than South Yarra, Cremorne, Collingwood, Melbourne / St Kilda Road, and Kew.
- Box Hill has a greater population living with a 45-minute public transport catchment than the other comparable suburbs, with the recorded catchment comparable to South Yarra (midpoint at Chapel Street / Toorak Road intersection).

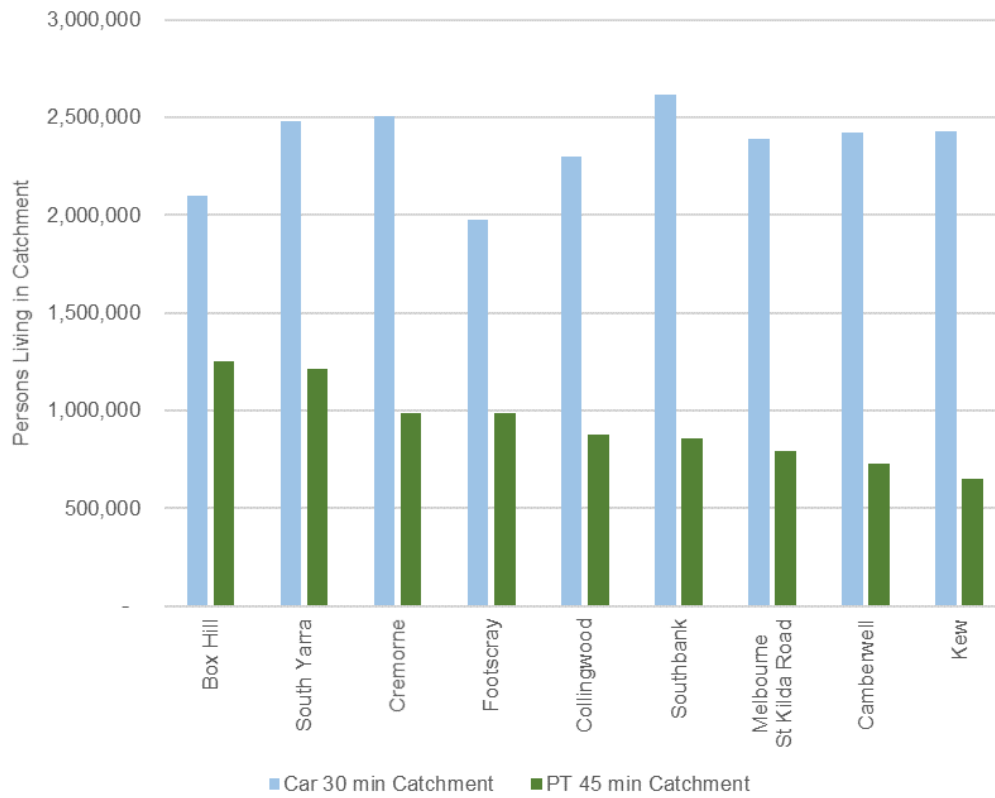
This analysis suggest that Box Hill is currently more accessible by public transport, but less accessible by car (other than Footscray), than other comparable suburbs and activity centres. This comparison highlights that the use of public transport to Box Hill should be favoured over private motor vehicle as the catchment of Box Hill by this mode is significant. From a car parking perspective, this comparison also highlights that should car parking provision be restricted In Box Hill, persons travelling to the area will have other transport options (and indeed these options are likely to be better than those that exist at other areas like Cremorne where reduced car parking rates are already adopted).

<sup>1</sup> This data has been sourced for this project and a recent engagement by Stantec as GTA for Tim De Young to appear on behalf of Boroondara City Council for an upcoming VCAT Hearing for an office development in Kew.

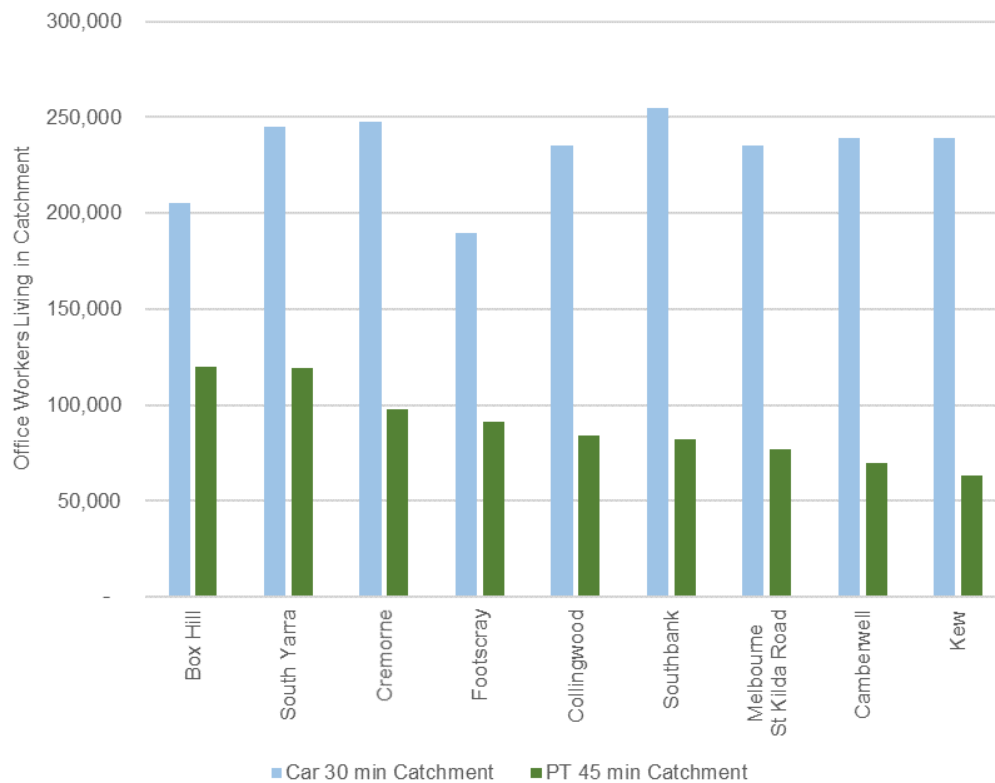




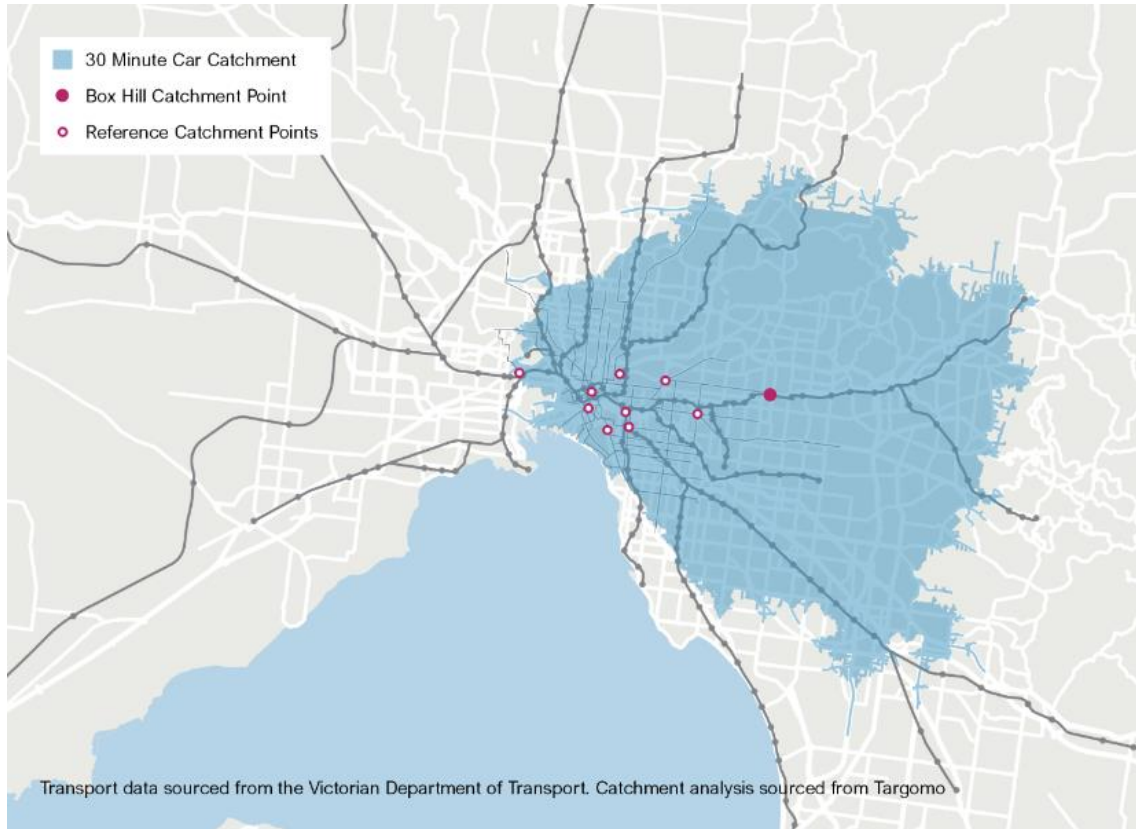
**Figure 2.12: Persons Living in Catchment**



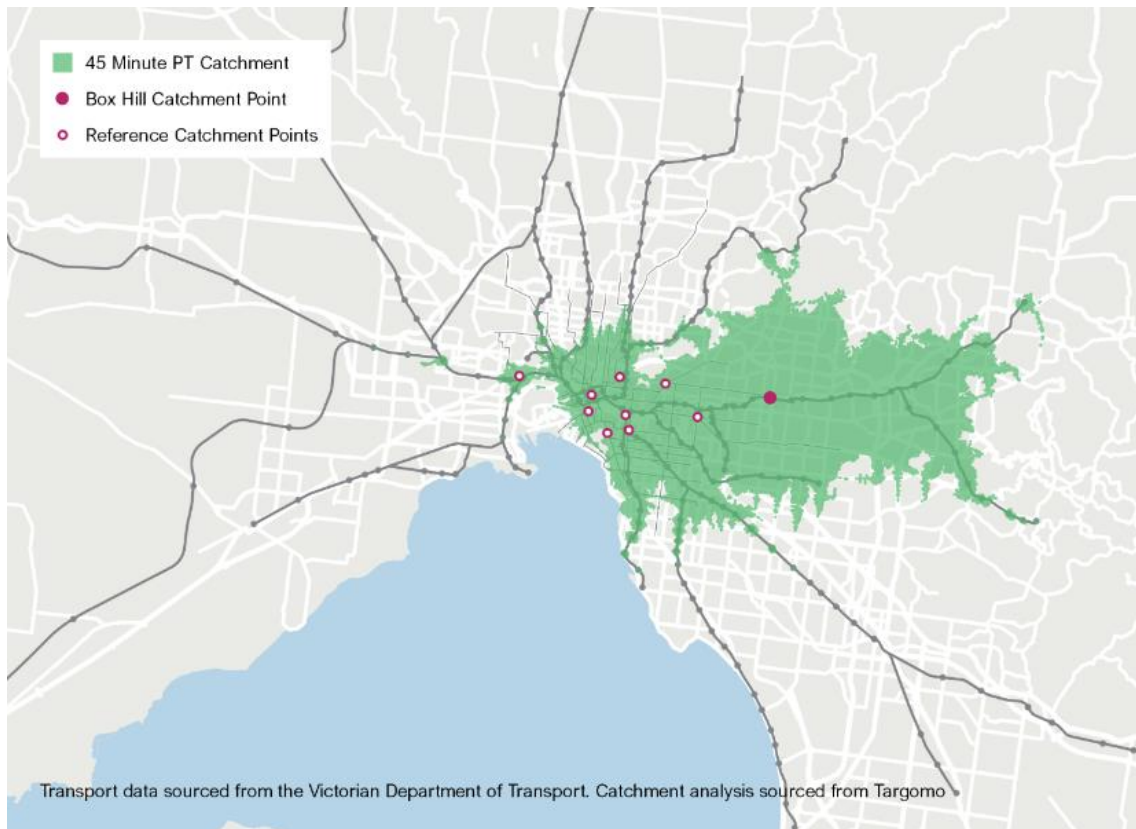
**Figure 2.13: Office Workers Living in Catchment**



**Figure 2.14: Car Catchment – 30-minute Journey – Reference Map**



**Figure 2.15: Public Transport Catchments – 45-minute Journey – Reference Map**



## 2.6 POLICY & INFRASTRUCTURE PLANNING

### 2.6.1 PLAN MELBOURNE

Plan Melbourne, the principal planning policy document in Victoria, seeks to address the challenge of managing Melbourne's rapid growth in a sustainable way by focusing, among other things, on the development of hierarchy of activity centres in which growth can be focused.

It identifies Box Hill as one of the nine current Metropolitan Activity Centres (MACs) in Melbourne (noting there are 2 future MACs to be added) – i.e., key activity and public transport hubs serving as priority locations for future retail, housing and employment growth.

### 2.6.2 BOX HILL INTEGRATED TRANSPORT STRATEGY

In September 2020, Whitehorse Council adopted the Box Hill MAC Integrated Transport Strategy (ITS). The ITS includes an action plan which identifies 21 key initiatives with 61 specific actions to provide a vision for the future of the Box Hill Metropolitan Activity Centre (MAC) and its surrounding area.

The document is underpinned by the vision statement for the creation of “an integrated, safe and accessible transport system, providing a range of sustainable and efficient ways for people and goods to move around, allowing and promoting Box Hill to thrive as the pre-eminent urban centre for Melbourne's east.”

As part of the ITS, community consultation was undertaken which confirmed that strong support existed to favour sustainable modes of transport within the activity centre even at the cost of reducing private vehicle parking and increasing vehicle travel times. Key findings from the draft ITS is shown Figure 2.16.

Figure 2.16: Key Headlines from Community Consultation



**Improved safety** – 74 percent support a decrease in the speed limit to 40 kilometres per hour where there is a mix of pedestrians and cyclists.



**Public transport** – 93 percent support increasing public transport use in and around the centre, including dedicated bus lanes along major roads and bus priority at traffic lights.



**Walking** – 89 percent support prioritised walking infrastructure (e.g. new pedestrian zebra crossings and more green signal time to cross roads) even if there are minor car delays.



**Transit oriented design** – 66 percent support giving new buildings near the transport interchange the opportunity to reduce their parking requirements by providing alternatives such as car share and bike parking.

### 2.6.3 SUBURBAN RAIL LOOP

The Suburban Rail Loop (SRL), announced in 2018, has been proposed to connect to Box Hill which will only further improve public transport access for Box Hill. The Victorian Government has provided \$9.3 billion towards major works on stage 1 of the SRL project –SRL East – with trains expected to be running by 2035.

The SRL is proposed to fundamentally change public transport access for Melbourne, directly connecting priority suburbs and precincts outside the inner city (such as Box Hill) and reducing reliance on the radial transport network and road network.

The project will connect the middle suburban regions, including the Monash NEIC, Burwood education precinct, Box Hill Metropolitan Activity Centre (MAC), La Trobe NEIC, Broadmeadows MAC, Melbourne Airport, Sunshine NEIC and Werribee NEIC, as well as three of our major university precincts — Monash, La Trobe and Deakin.

Figure 2.17 shows the conceptual alignment of SRL, noting that Stage 1 of the project will include Cheltenham to Box Hill. Upon its completion, it will substantially improve public transport access for Box Hill and provide even greater opportunities for public transport use as the preferred mode of travel for its residents, employees, and visitors. Figure 2.18 shows the location of Box Hill Station relative to the study area.

**Figure 2.17: Suburban Rail Loop Concept Map (Source: Victoria’s Big Build)**

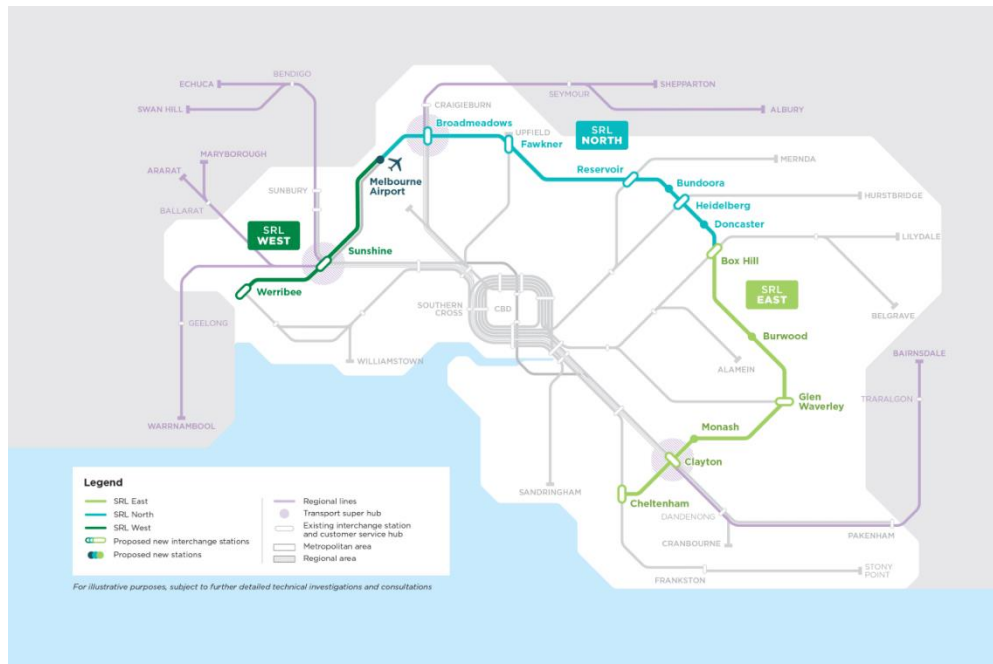
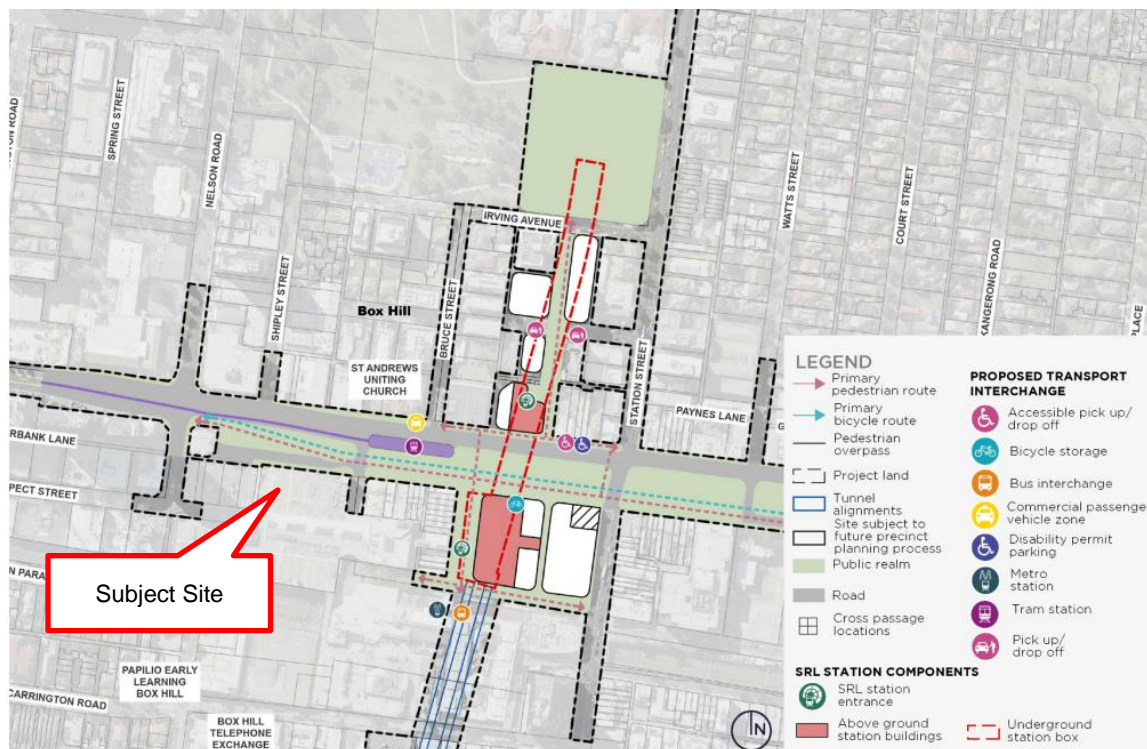


Figure 2.18: Suburban Rail Loop Box Hill Station (Source: SRL Authority, EES Summary Report)



## 2.6.4 BOX HILL TRANSIT INTERCHANGE STEERING COMMITTEE REPORT

Prepared in 2019, the Department of Transport's Box Hill Transport Interchange (BHTI) Steering Committee Report explores the future development of the BHTI and improvements to the bus network through Box Hill. It recognises Box Hill as functioning as a Central Business District and describes Box Hill as 'Melbourne's second CBD'.

The report outlines an Investment Logic Map supported by the Department of Development, Jobs, Transport and Resources which describes the current problems and proposes responses and solutions to the identified issues. Overall, these responses and solutions seek to improve the commuter transport services and increase the connectivity of the Box Hill Activity Centre (BHAC). A summary list of the responses and solutions, as it relates to the site are:

- Improve BHTI operational efficiency
- Improve the amenity and function of the BHTI
- Increase the carrying capacity of the BHTI
- Review and improve BHAC pedestrian movements and connectivity
- Clarify future growth and development opportunities of BHAC, and implications for future transport and community requirements
- Reorganise BHAC road network to support efficient transport movements

The report also recognises that Box Hill has been subject to major growth in recent decades and there have been several infrastructure upgrades to transport modes such as rail, bus and private vehicle to ensure access is maintained. It notes, however, that the same level of investment has not been made toward the pedestrian network and identifies a long walk between the current interchange and key destinations such as Box Hill Institute. It recommended that the pedestrian network is considered in any future interchange works.

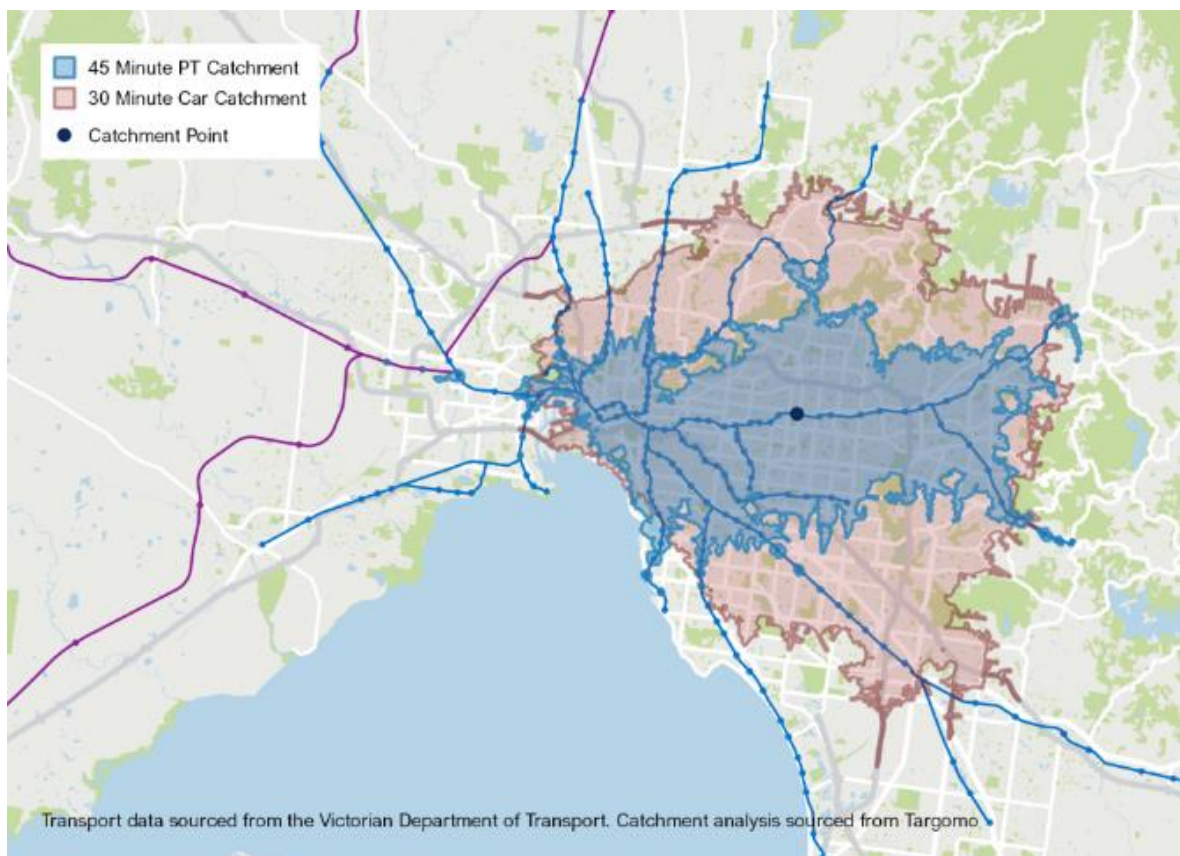
## 2.7 IMPLICATIONS FOR BOX HILL CENTRAL NORTH

The Box Hill Central North precinct is highly walkable and accessible by a range of high-frequency public transport services, including bus, tram, and train services within 200m of the site. In contrast, its road and cycling networks are either constrained or underdeveloped.

The net result of these conditions is that Box Hill enjoys a particularly large catchment of persons (and workers) living within a 45-minute public transport journey of the site. This catchment is large not only in comparison to other suburbs and activity centres (as summarised earlier in this chapter), but also in comparison to the catchment of persons living within a 30-minute car journey of the site. This latter comparison is outlined in Figure 2.15 (which overlays the previously presented public transport and car catchments on the same figure) and highlights that a significant proportion of persons living within a 30-minute car journey of the site could alternatively travel to the site via public transport within 45 minutes.

After the completion of the Suburban Rail Loop (SRL) project, and other improvements to the bus network (as is recommended in Box Hill Transit Interchange Steering Committee Report), it follows that the public transport catchment will significantly increase and potentially even exceed the available car catchment of Box Hill. This infrastructure commitment provide confidence that development in Box Hill can and should proactively favour walking, cycling and public transport use, over private motor vehicle, to best manage transport impacts and improve the liveability of the precinct. This approach is supported by State and local policy as well as Whitehorse City Council (draft) Box Hill MAC Integrated Transport Strategy.

**Figure 2.19: Existing Vehicle and Public Transport Catchments from the Site**



# 3 Traffic Generation

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### 3.1 OVERVIEW

The Box Hill MAC has exceptional public transport access which will only improve with the proposed infrastructure investments such as the Suburban Rail Loop, which will only continue as the site further develops as a metropolitan activity centre.

As it stands currently, access to Box Hill is predominantly by private vehicle, however ABS journey to work data suggests that public transport comprises 30% of all trips to work at Box Hill which is double the Greater Metropolitan Melbourne average of 15% (ABS, 2016).

This assessment adopts the approach of acknowledging the future aspiration for the Box Hill MAC and seeks to minimise private transport and engrain sustainable travel habits early in the development.

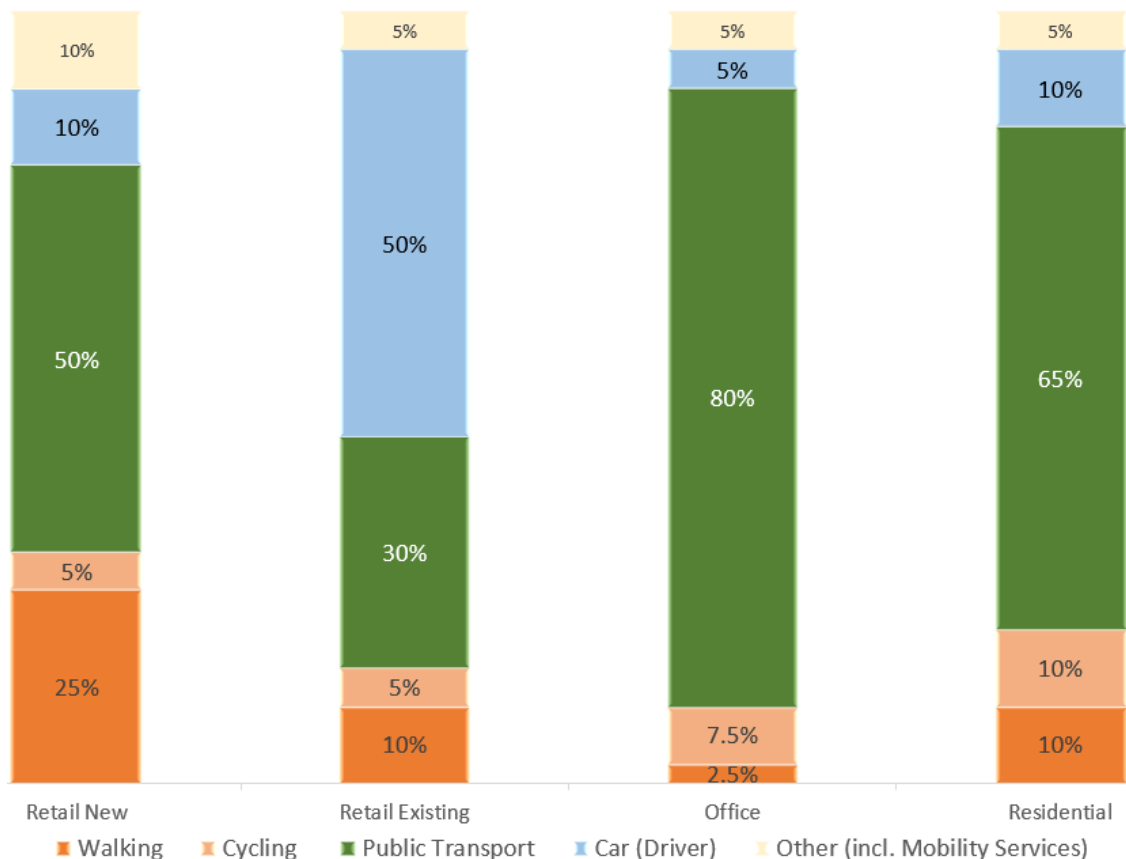
### 3.2 MODE SHARE TARGETS

For the purposes of the assessment contained in this report, mode splits for additional trips to/from the proposed commercial, residential, and retail land uses have been assumed.

The target mode splits have been assumed based on our experience on other projects but remain indicative only and for use only to estimate peak hour trips. The mode splits are slightly different to those presented in previous Stantec reports only as separate mode splits have been provided for each land use.

The assumed / target mode splits assumed in this report are shown in Figure 3.1.

**Figure 3.1: Assumed Mode Share**





### 3.3 ESTIMATED TRIP GENERATION

The forecast trip generation of the land uses envisaged in the masterplan is detailed in Table 3.1 and summarised in Figure 3.2, assuming the sources quoted and trip containment factors of 50% and 20% for retail and residential land uses, respectively.

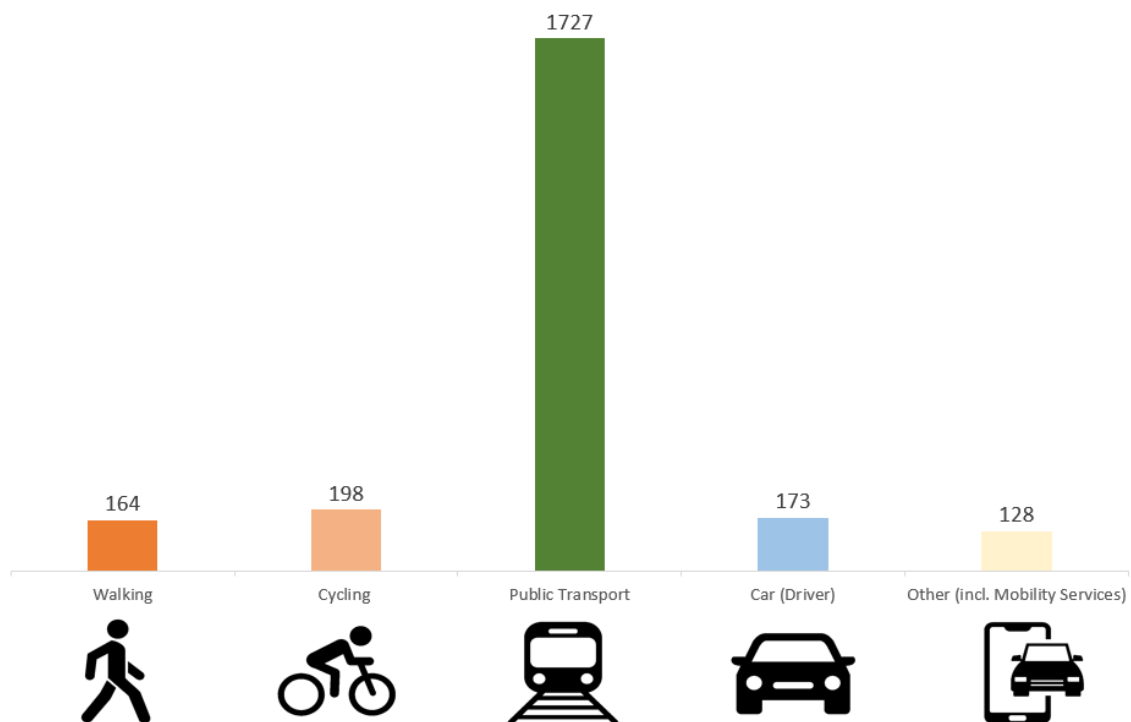
**Table 3.1: Estimated Trip Generation during Weekday PM Peak Hour**

Land Use	Size	Trip Generation Rate	Trip Generation Estimate	External Trip Generation Estimate
<b>Retail</b>	4,279sqm	7.5 trips / 100sqm [1]	321 trips	161 external trips
<b>Commercial</b>	65,956sqm	2.0 trips / 100sqm [2]	1,319 trips	1,319 external trips
<b>Residential</b>	1,777 apartments	0.65 trips / apartment [1]	1,138 trips	910 external trips
<b>Total</b>				<b>2,390 external trips</b>

[1] Assumed, using guidance from NSW RMS Technical Direction (TDT 2013/04a)

[2] Assumed, using guidance from NSW RMS Technical Direction (TDT 2013/04a). Represents average rate for inner metropolitan offices and rounded up to nearest 0.5.

**Figure 3.2: Estimated Trip Generation during Weekday PM Peak Hour**



The assessment indicates that the land uses envisaged in the masterplan could be expected to generate approximately 2,390 external person trips during the weekday PM peak hour, including approximately 1,727 person trips on public transport, 198 person trips by cycling only, 164 person trips by walking only, 173 person trips by car (as driver), and 128 person trips by other modes including ride share.

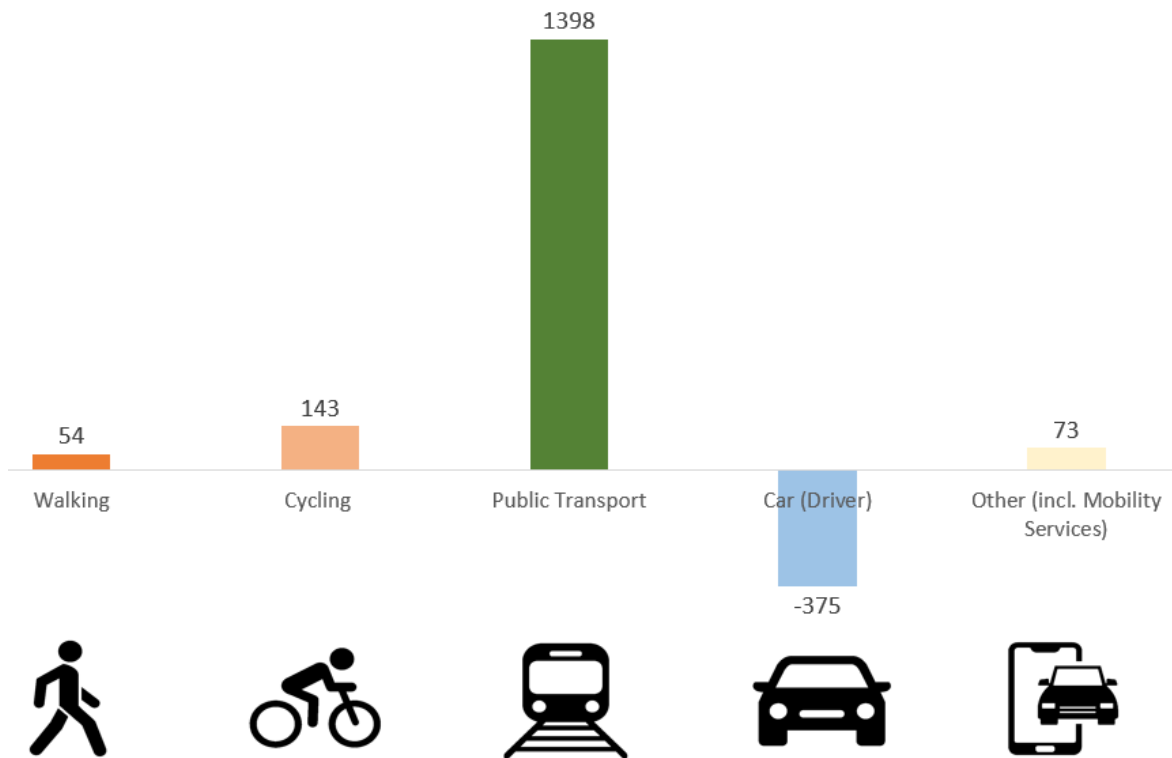
### 3.3.1 NET GENERATION INCREASE

It is important to note that the total estimate outlined above represents the expected total trip generation of the site following its full development and does not represent a net trip generation increase (above the existing generation of the site).

The existing use of the site as a shopping centre with 14,599sqm of retail floor area is likely to generate approximately 1,095 person trips during the weekday PM peak hour, assuming a trip generation rate of 7.5 trips per 100sqm and excluding any trip containment discount<sup>2</sup>. Traffic surveys undertaken in 2018 at the site indicate that approximately 550 vehicle trips are generated by the retail car parks in Box Hill Central North. This data suggests that the existing use of the site has a relatively high reliance on car driver as a mode of transport; equal to approximately 50%. Using this existing mode share to car driver as a base, the following mode shares have been assumed for the existing retail land use: 10% walking, 5% cycling, 30% public transport, 50% car driver and 5% other<sup>3</sup>.

Allowing for the existing trip generation of the retail floor area on the site (at the mode shares outlined above), an estimate of the net trip generation increase following the full development of the site is presented in Figure 3.3. This assessment highlights that public transport trips are expected to notably increase (+1398 trips per hour) whilst vehicle trips are expected to decrease (-375 trips per hour).

**Figure 3.3 Estimated Trip Generation during Weekday PM Peak Hour – Net Increase over Existing**



<sup>2</sup> The adoption of a trip containment factor would not typically be applied in a single land use development, particularly for a retail shopping centre which has a broader trade catchment.

<sup>3</sup> These modes shares differ to those proposed for the new retail floor areas in the masterplan as the new area is expected to operate as complementary to the office and residential land uses (not as standalone shopping centre).

# 4 Design Principles

04



## 4.1 APPROACH

In the context of the existing site context, the masterplan for Box Hill Central North has been developed with an approach that:

1. Prioritises walking and cycling within and through the precinct.
2. Enhances connectivity to surrounding public transport services, both for the residents / employees / visitors of the precinct itself and the broader community in the surrounding area.
3. Creates an improved public realm within the precinct, including the provision of a new street network through the site (extension of Prospect Street and Clisby Court) which accommodate the diverse needs of all users.
4. Limits the provision of car parking (as far as commercially practicable) to proactively reduce traffic impacts of the development of the site by encouraging the use of public transport.

## 4.2 KEY DESIGN PRINCIPLES

The design of the public realm / new street network has been developed having regard to the principles set out in the **Global Street Design Guide** (prepared by Global Designing Cities Initiative in collaboration with NACTO) which advocates for the prioritisation of people in this design process. This typically entails recognising both the movement and place function of successful streets, as depicted in the street design hierarchy shown in Figure 4.1.

Figure 4.1: Street Design Prioritisation



Key design principles that have been sourced from this design guide include (but are not limited to) the following:

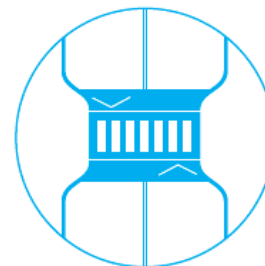
#### Streets for Everyone

Design streets to be equitable and inclusive, serving the needs and functions of diverse users with particular attention to people with disabilities, seniors, and children. Regardless of income, gender, culture, or language, whether one is moving or stationary, streets must always put people first. See 6: *Designing Streets for People*.



#### Streets for Safety

Design streets to be safe and comfortable for all users. Prioritize the safety of pedestrians, cyclists, and the most vulnerable users among them: children, seniors, and people with disabilities. Safe streets have lower speeds to reduce conflicts, provide natural surveillance, and ensure spaces are safely lit and free of hazards. See 1.5: *Safe Streets Save Lives*.



#### Streets are Multidimensional Spaces

Design the street in space and time. Streets are multidimensional, dynamic spaces that people experience with all their senses. While the ground plane is critical, the edges and the canopy play a large role in shaping a great street environment. See 5.3: *Immediate Street Context* and 6.3.4: *Sidewalks-Building Edges and Facades*.



#### Streets for Health

Design streets to support healthy environments and lifestyle choices. Street designs that support active transportation and integrate green infrastructure strategies improve air and water quality, can reduce stress levels, and improve mental health. See 1.6: *Streets Shape People*.



#### Streets are Public Spaces

Design streets as quality public spaces, as well as pathways for movement. They play a big role in the public life of cities and communities, and should be designed as places for cultural expression, social interaction, celebration, and public demonstration.



#### Streets are Multimodal

Design for a range of mobility choices, prioritizing active and sustainable modes of transport. Safe, efficient, and comfortable experiences for pedestrians, cyclists, and transit riders support access to critical services and destinations and increase the capacity of the street. See 1.7: *Multimodal Streets Serve More People*.



## 4.3 CONSISTENCY WITH MOVEMENT & PLACE FRAMEWORK

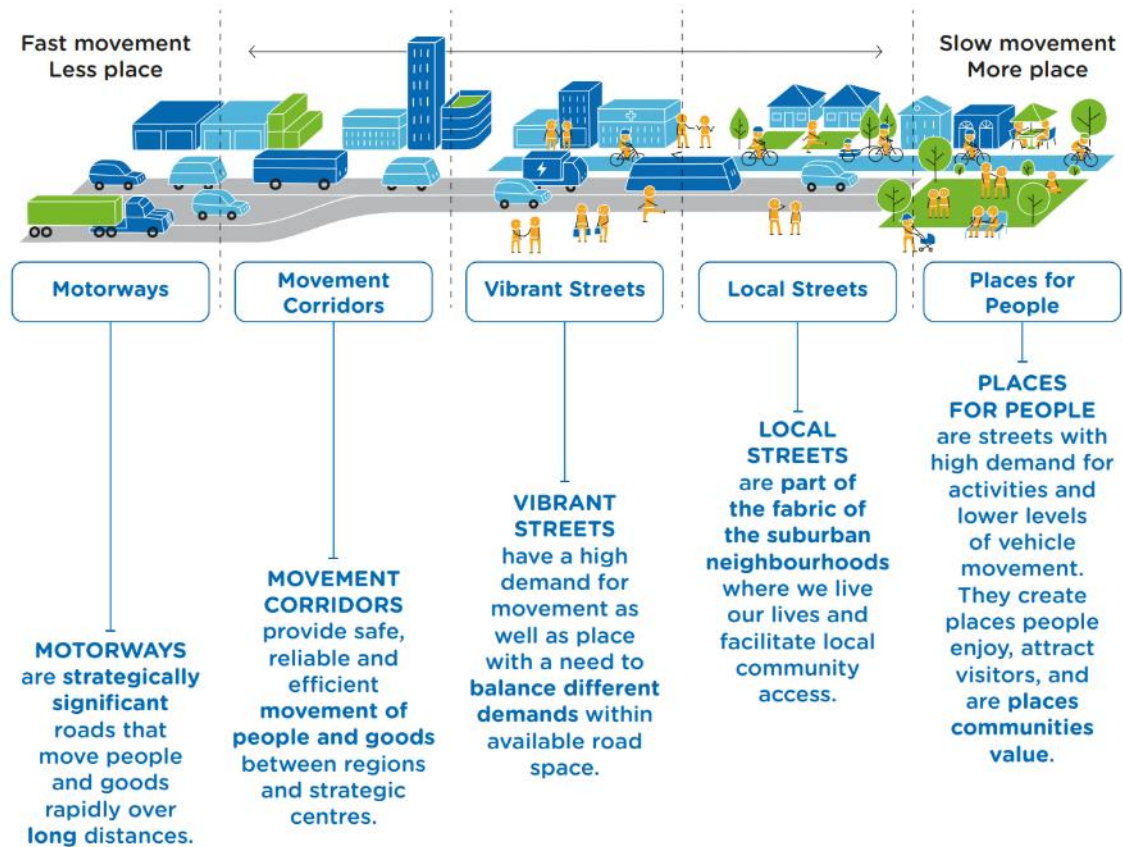
The design principles outlined above align with Movement and Place framework adopted in Victoria (and elsewhere in Australia) which considers the use and classification of a street in terms of its movement function alongside its place function.

For major highways and arterial roads, the movement function is paramount whereas the place function is all but irrelevant. However, for minor streets such as that proposed through the Box Hill Central North precinct, the place function is paramount, and the movement function is a lesser consideration.

The Movement and Place framework seeks to provide a consistent methodology for designing streets that are best suited to prioritising travel movement, and those where greater interaction between people and places can be encouraged. Movement and place principles and framework are broadly illustrated in Figure 4.2.



Figure 4.2: Movement and Place Framework

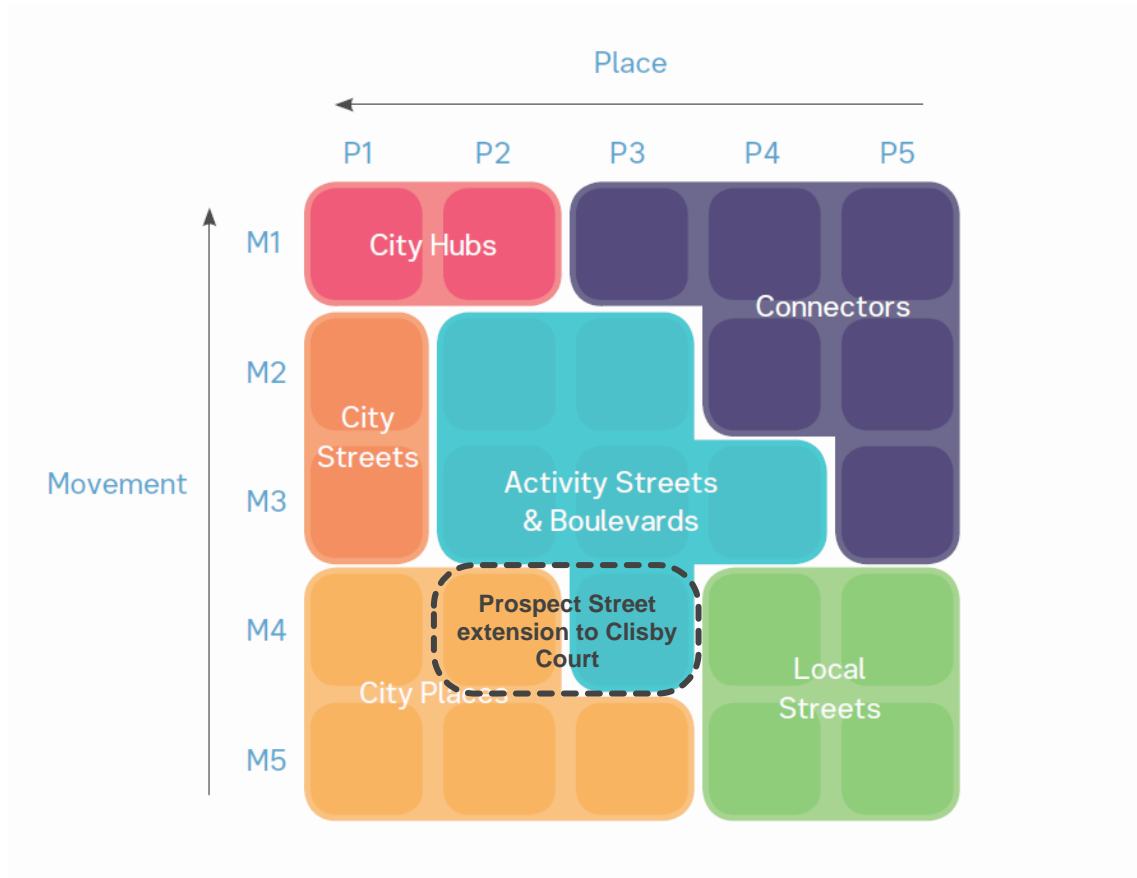


In the definition of street types according to the movement and place framework, a street is assigned a movement classification and a place classification on a scale of one to five. A movement classification M1 indicates a street which serves a mass movement function of people and/or goods with state or national-level significance and M5 indicates local movements only. Similarly, a P1 classification is assigned to a place of state or national significance and a P5 indicates a place of local significance only.

In the design of the Prospect Street extension to Clisby Court, the purpose of the road and its potential or desired function is considered foremost which ultimately drives the design of the street and street scape, so that it matches the intended purpose of the street. In terms of movement, the purpose or desire of the road will be primarily to provide access to the individual lots for people and goods. In terms of place, the road is situated within a precinct with active ground floor frontages, features public amenities as part of the Public Realm, and includes set-back of building frontages.

In this regard, it is concluded that the desired function and purpose of the new street network within Box Hill Central North, according the movement and place framework, is in the range of a M4 (movement of people and/or goods within a municipality) and P2 or P3 (place of regional/municipal significance) as shown in Figure 4.3 which denotes the street as a “city place” or “activity streets & boulevards”.

**Figure 4.3: Movement and Place Framework, Street Types Assessment Diagram**



The overarching implication of the use of this framework is that the design of the new internal street should focus on the optimisation of the street as a place where people are likely to dwell, with traffic movement being subservient. In this context, congestion on the street should not be seen as a “problem to solve” at the expense of the place or the movement of people, but rather an acceptable outcome that may act to discourage vehicle traffic and maximise the amenity of the street as a place.

# 5 Walking and Cycling Responses

05





## 5.1 PREAMBLE

The development envisaged in the masterplan is expected to (ultimately) generate up to approximately 1,891 pedestrian trips during the weekday PM peak hour, including 1,727 person trips to/from nearby public transport services and 164 walking only trips. In addition, approximately 198 cycling trips can be expected in this peak hour.

The accommodation of this trip generation and other pedestrian trips that will occur through the site to/from surrounding areas will be critical to the success of the precinct. The masterplan proposes to achieve this outcome via a series of design responses, as outlined below. These responses will enhance pedestrian permeability and safety of the Box Hill MAC to the benefit of the residents / employees / visitors of the precinct and the broader community.

## 5.2 RESPONSE 1 – NEW STREET NETWORK

The masterplan proposes the creation of a new street network through linking Prospect Street and Clisby Court, as shown in Figure 5.1.

Figure 5.1: New Street Network

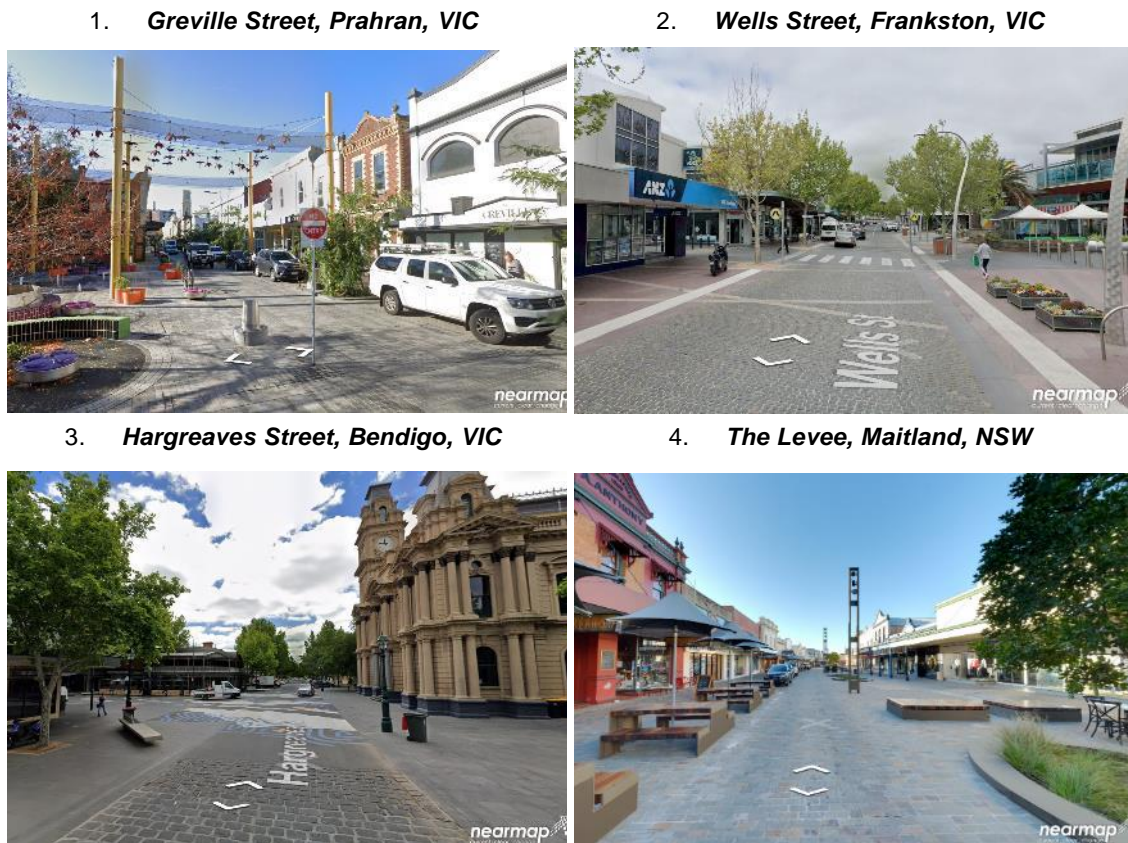


In accordance with the principles outlined in Section 3 of this report, the new street network has been designed with the following key features:

- The width of the traffic carriageway has been minimised as far as practicable for the required vehicles and the verge widths widened to accommodate the anticipated pedestrian movements to, from and through the precinct as well as seating opportunities for adjacent cafes.
- The vehicle access to adjacent development lots for car parking and loading is proposed via laneways running off the new street (other than for Lot 4) to minimise vehicle-pedestrian conflicts. These laneways will be designed as crossover-style driveways to the new street to maintain pedestrian priority across the footpath.
- The provision of 'sharrow' bicycle line marking on the new street network to promote the shared use of the carriageway for cyclists and vehicles. (The provision of this treatment is considered appropriate for the precinct given the proposed activation of footpaths and anticipated low traffic volumes on the street).
- The street will be constructed with the following pedestrian crossings / provisions:

- At the Whitehorse Road interface: The street will feature a raised pedestrian threshold treatment to slow vehicle movements and prioritise the movement of pedestrians crossing along the southern side of Whitehorse Road.
- At the Nelson Road interface: The existing roundabout will be converted to a give-way raised T-intersection (the southern laneway closed to vehicles) with kerb extensions and pedestrian zebra crossing on all legs to make it safer for pedestrians to cross.
- At the junction where the extension of Prospect Street meets Clisby Court: The street will be configured as a shared environment, with (for example) a raised pavement which is flush with the adjacent verge widths. The purpose of the shared environment is to improve the safety for vulnerable road users (such as pedestrians and cyclists), whilst still maintaining adequate access for vehicles. The shared zone is strategically located to present as an extension to the public plaza and link to Main Street which is the primary pedestrian connection to the train station and Box Hill MAC. Exemplar shared environments from Victoria and NSW are shown in Figure 5.2.
- The new street network will be design in such a way which will permit the closing of the road for events to allow for pedestrian overflow.

**Figure 5.2: Exemplar Shared Environments**

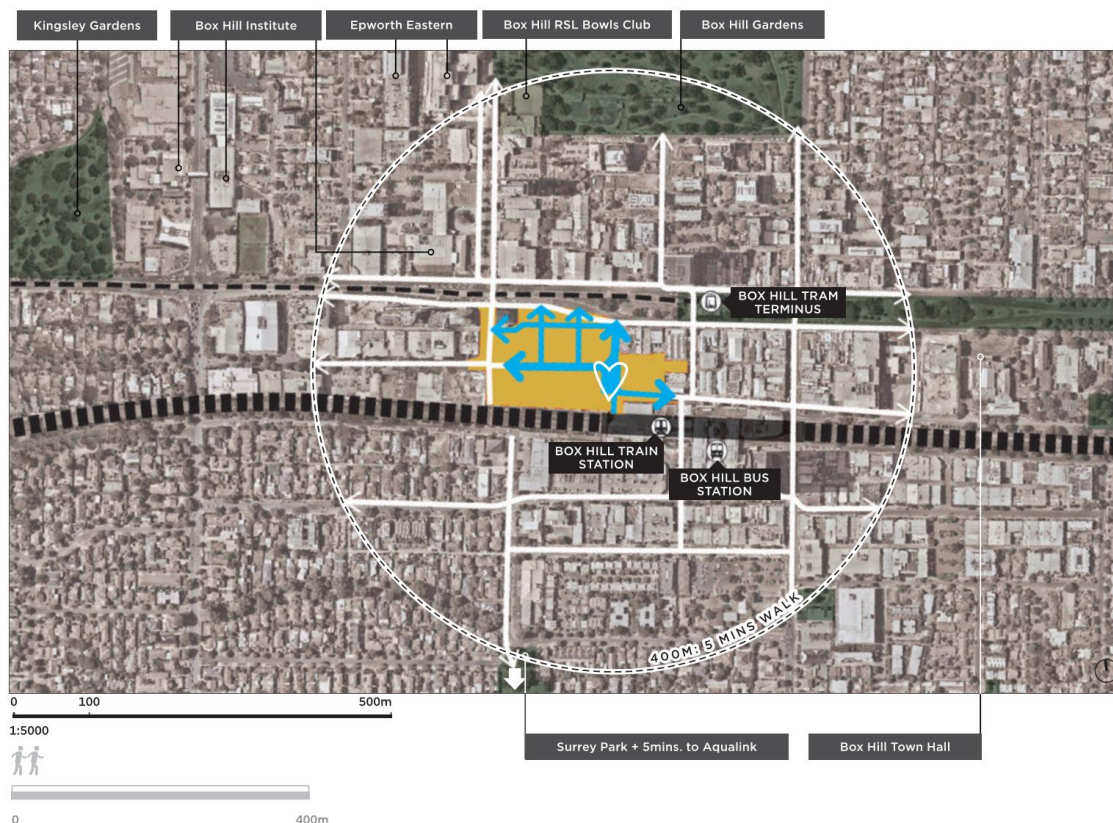


### 5.3 RESPONSE 2 – EXTENDED PEDESTRIAN MALL

The masterplan addresses the existing lack of pedestrian connectivity in an east-west direction through the site (which is precluded by the existing built form of the retail land uses) via the extension of Main Street to the new street network.

This link will create a direct access to Box Hill Station and create a means for greater connectivity in the Box Hill MAC and surrounding destinations such as Box Hill Hospital and Box Hill Institute. The proposed improvement to the pedestrian access and permeability is shown in Figure 5.3.

**Figure 5.3: Walkability with Extended Pedestrian Mall (Source Lat27, Public Realm Master Plan)**



## 5.4 RESPONSE 3 – FAIRBANK LANE CLOSURE & FAIRBANK PARK

The masterplan proposes the closure of Fairbank Lane to the immediate north of the Box Hill Central North site to enable the opportunity to extend the parklet located adjacent Whitehorse Road, referred to as “Fairbank Park”.

The closure of Fairbank Lane and the provision of Fairbank Park will enhance the amenity of the area and the accessibility and safety of pedestrians. It will provide connections between Whitehorse Road and Prospect Street via footpath connections to the laneways.

As part of the closure, new access arrangements for 852 Whitehorse Road are proposed. This includes the provision of additional car parking and vehicle turn around space such that all vehicle access is provided via Nelson Road.

## 5.5 RESPONSE 4 – THURSTON STREET BICYCLE CONNECTION

The masterplan has been designed to provide a laneway along the western edge of the site to provide an area which could be used by Council to incorporate a future cycle and pedestrian link over the train line as identified in the Box Hill Integrated Transport Study. This laneway is not proposed to be used as part of the masterplan and has been set aside to not preclude the future provision of a bicycle connection.

An indicative cycle path design has been prepared for the masterplan showing how the masterplan could integrate with a future bicycle path should it be provided at a future point. This design is included in Appendix B. It includes:

- The removal of one traffic lane in each direction to provide dedicated cycle paths along Nelson Street.
- Sharrow type arrangement from Prospect Street
- A cycle path in the space provided to the west of Lots 6 and 7.

It is noted that is plan is provided as a potential design-oriented solution, it is expected that the feasibility bicycle lanes along Nelson Street and via a new bridge (rail overpass) is subject to further assessment by others. Notwithstanding, traffic modelling has been undertaken for the proposed design to gain a high-level understanding of the impacts on the vehicular performance of Nelson Street.

## 5.6 BICYCLE PARKING INFRASTRUCTURE

The Whitehorse Planning Scheme requires that bicycle parking be provided at the following rates:

- Residential: 1 residential space per 5 dwellings plus 1 visitor space per 10 dwellings
- Office: 1 staff space per 300sqm NFA plus 1 visitor space per 1000sqm NFA
- Retail: 1 staff space per 300sqm LFA for employees & 1 visitor space per 500sqm LFA

The masterplan has been prepared assuming these minimum provisions are notably exceeded to each lot and that the bicycle parking is provided near the ground plane for each of access. Indeed, provision exceeding the statutory minimums was adopted for Lots 4 and 5 (will additional visitor spaces provided within the Public Realm).

## 5.7 SUMMARY

The masterplan proposes the following walking and cycling responses:

- The creation of a new street network linking Prospect Street and Clisby Court which is highly pedestrianised.
- The extension of Main Street to the new street network to improve pedestrian connectivity to, from and through the site for the benefit of the Box Hill MAC and surrounding destinations like Box Hill Hospital and Box Hill Institute of TAFE.
- The closure of Fairbank Lane to the immediate north of the Box Hill Central North site to provide the opportunity to extend the parklet and provide “Fairbank Park” located adjacent Whitehorse Road.
- The provision of area to facilitate ability for Council to incorporate future cycle and pedestrian link over the train line along the western edge of the site.
- The provision of bicycle parking infrastructure which will exceed statutory requirements.

These responses can be expected to safety and efficiently accommodate the anticipated active travel demands of the development of the site and enable enhanced connections to the Box Hill MAC and surrounding land uses likes Box Hill Hospital and Box Hill Institute of TAFE.

It is noted that the responses are also consistent with the overarching themes and recommendations of Whitehorse City Council’s Box Hill ITS which speaks to the allocation of road space to more efficient and sustainable modes of transport, providing a safe and secure transport network, providing accessible and integrated walking, cycling and public transport networks.



# 6 Public Transport Responses

06



## 6.1 PREAMBLE

The development envisaged in the masterplan is expected to (ultimately) generate up to approximately 1,727 person trips to/from surrounding public transport services. These trips are likely to be spread across the tram, bus, and train services, but the majority will likely occur via train.

As outlined earlier in this report, there are significant works proposed over the coming decade to improve public transport accessibility in Box Hill. Most notably, the construction of the Suburban Rail Loop (SRL) project will substantially improve public transport access for Box Hill (which already exceeds comparable suburbs and activity centres) and provide even greater opportunities for public transport use as the preferred mode of travel for its residents, employees and visitors.

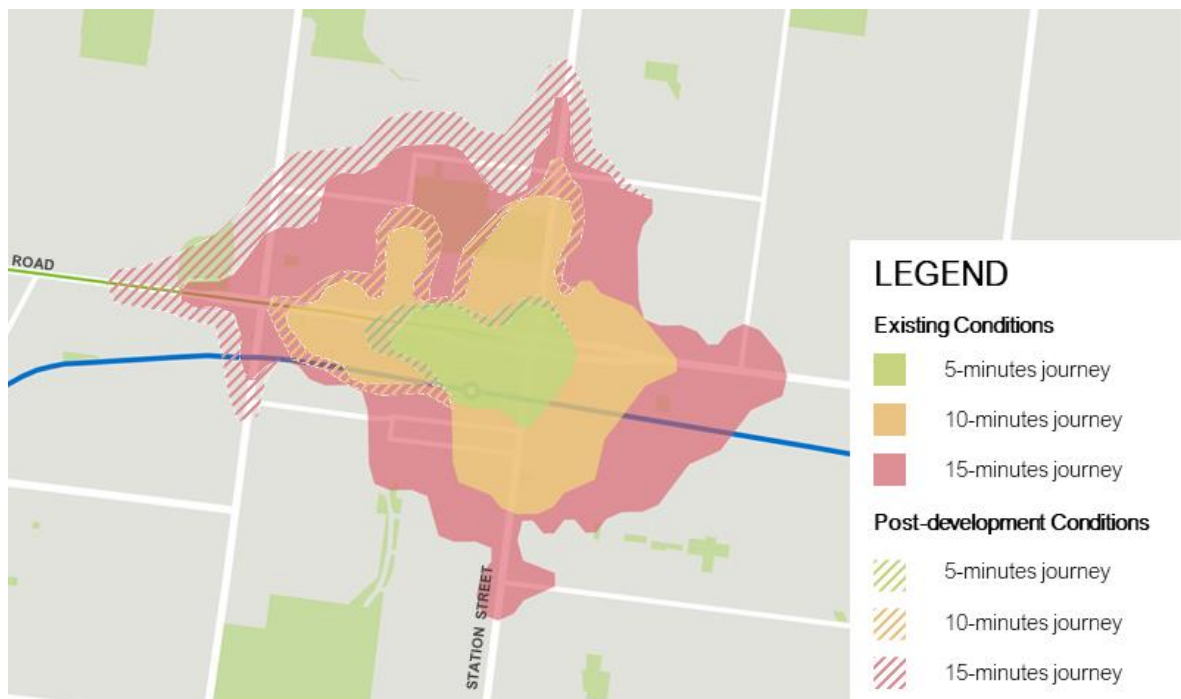
With the responsibility for these public transport infrastructure projects lying with Government, the masterplan focuses on means to encourage use of public transport as the preferred mode of transport for its development and the surrounding area.

## 6.2 RESPONSE 1 – IMPROVED STATION ACCESSIBILITY

The most significant improvement facilitated by the masterplan that encourages public transport use is the creation of the improved public realm and pedestrian connections as outlined in the previous section.

These improvements include (but are not limited to) the extension of Main Street through the site which will notably improve pedestrian connectivity and safety to, from and through the site for the benefit of the development, the broader Box Hill MAC and surrounding destinations like Box Hill Hospital and Box Hill Institute of TAFE. This benefit is shown in Figure 6.1 which illustrates that the extension will improve accessibility of the surrounding area to Box Hill Train Station (which may ultimately result in the greater use of public transport by this surrounding area).

**Figure 6.1: Approximate Walking Catchment Improvement**



## **6.3 RESPONSE 2 – REDUCED CAR PARKING PROVISION**

The proposed development envisaged in the masterplan will be accompanied by a car parking provision that is notably lower than statutory requirements as a proactive means reduce traffic impacts by encouraging the use of public transport. These parking rates are discussed in Section 8 of this report.

## **6.4 RESPONSE 3 – OTHER GREEN TRAVEL PLAN INITIATIVES**

It is expected that the use of public transport as the preferred mode of travel to/from the precinct will be supported through a range of other 'soft measures', such as supporting Green Travel Plans for each development and the implementation of clear wayfinding signage within the new public realm.

## **6.5 SUMMARY**

The masterplan proposes the following public transport responses:

- The provision of improved pedestrian connections through the site from its development and the surrounding area to the train station. (The public transport accessibility of this train station is also to be enhanced by the proposed Suburban Rail Loop project).
- The provision of car parking at rates well below statutory requirements as a proactive means to reduce traffic impacts by encouraging the use of public transport.
- The commitment to other "soft measures", such as Green Travel Plans for each development and enhanced wayfinding signage within the new public realm.

In combination with the SRL project (and other potential upgrades / improvements to the existing bus network, as recommended in the draft Box Hill Transit Interchange Steering Committee Report), these responses can be expected to accommodate the anticipated active travel demands of the development of the site.

# 7 Traffic and Car Parking Responses

07





## 7.1 PREAMBLE

The development envisaged in the masterplan is expected to (ultimately) generate up to approximately 239 person trips by car during the weekday PM peak hour<sup>4</sup>.

This generation is modest in the overall context of the development as the transport approach adopted for the masterplan purposefully seeks to reduce the car parking provision to encourage public transport use and reduce traffic impacts. Specifically, it is noted that architectural plans prepared by Bates Smart for the masterplan indicate that approximately 1,398 car spaces are envisaged in the seven development sites, including (approximately) 202 car spaces for the office floor area and 1,196 car spaces for the residential apartments<sup>5</sup>.

The masterplan proposes several responses to manage this trip generation, including (but not limited to) the reduced parking rates. These responses are discussed below.

## 7.2 RESPONSE 1 – REDUCED PARKING RATES

### 7.2.1 OVERVIEW

As Box Hill continues to evolve into a Metropolitan Activity Centre, the approach to parking management will also need to become more aligned with the approach typically adopted in inner suburban and CBD locations.

Historically, the standard approach to car parking provision adopted for Box Hill has involved the setting of minimum car parking rates for land uses. This approach has historical origins which follow a ‘predict and provide’ approach. The Austroads ‘Guide to Traffic Management Part 11 (2017)’ describes this approach as a technique which readily interprets a ‘parking problem’ as an issue of ‘inadequate supply’. It notes that this problematic ideology is underlined by the premise that:

- “More parking is better,
- Every destination should satisfy its own parking needs (minimum ratios),
- Car parks should never fill,
- Parking should always be free or subsidised or incorporated into buildings costs.”

Over the past decade, the ‘predict and provide’ approach has been steadily replaced by a range of travel demand management techniques which challenge historical travel behaviours and encourage mode change away (reversing the trend) from private motor vehicle travel, particularly during road network peak hours. This approach is premised on the ability to limit the demand for car parking by restricting the available car parking supply both within development sites and within the streets surrounding activity centres to force mode share change. For Box Hill, this alternative approach is considered appropriate given surrounding streets are generally well protected and public transport access is excellent.

### 7.2.2 STATUTORY REQUIREMENTS

In 2015, Whitehorse City Council made its first step in the setting of more progressive parking rates for Box Hill by introducing a parking overlay which lowered the normal statutory requirements. These rates are still applicable and are summarised in Table 7.1.

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<sup>4</sup> This total includes 50% of the person trips expected by “other modes (including mobility services)”, as outlined in Section 3.

<sup>5</sup> An alternative approach to the estimation of the vehicle movements would entail adoption of a traffic generation rate per car space. Typically, up to approximately 0.4 and 0.15 vehicle movements per office and residential car space could be expected during the PM peak hour, respectively. Application of these rates would suggest that approximately 240 vehicle movements could be expected in the PM peak hour using this approach. This alternative estimate broadly aligns with the estimate detailed in this report in Section 3.

**Table 7.1: Statutory Parking Rates**

Land Use	Type	Statutory Minimum Rates	
		Resident/Employee	Visitor/Shopper
Residential	One-bed	0.5 per dwelling	0.1 per dwelling
	Two-bed	0.75 per dwelling	
	Three-bed	1.0 per dwelling	
Office	Office	2.0 spaces to each 100sqm NFA	
Retail	Shop	3.5 spaces to each 100sqm NFA	

### 7.2.3 RECOMMENDATION OF BOX HILL ITS

In September 2020, Whitehorse City Council adopted the Box Hill ITS, which involved extensive community consultation.

The Executive Summary of the ITS notes:

*“Development of this ITS has entailed the articulation of a transport vision for Box Hill which corresponds with the overall liveability goals for the community, focusing on environmental and economic sustainability, equity and safety to guide the future development of local transport.*

*The Vision (right) recognises that conventional means of addressing suburban transport – with its overwhelming reliance on private vehicles and parking – will not be capable of absorbing the expected rise in travel demand in the coming decades.*

*In other words, the underlying focus on sustainable and more efficient transport modes is not only an environmental responsibility but is also necessary to maintain basic levels of mobility for residents, workers and visitors in light of rapid growth.”*

The issue of car parking provision for the Box Hill MAC is specifically addressed in Section 17 of the ITS, which states:

*“As cities across the world begin to prioritise city living that does not require using a car for every trip, many local governments are moving away from blanket policies of providing abundant parking.*

*Many are adjusting planning rules and parking prices to discourage driving when other options are available, and in some cases even prohibiting new parking spaces from being built in congested or sensitive locations.*

*There is precedence of other activity centres in Melbourne that have imposed maximum statutory parking rates on developments, including Footscray, which like Box Hill, is designated as a Metropolitan Activity Centre. Applying similar changes to the planning scheme will enable Box Hill to slow the growth of the number of private vehicles and congestion within the MAC.”*

In this context, Action 17.1 of the ITS recommended:

**Review development parking rates in planning scheme**

***Review parking rates and investigate replacing parking rate minimums with maximums for new developments, as part of a planning scheme amendment to alter the existing car parking overlay.***

***In the long term, this could also allow for the decoupling of the sale of parking spaces from apartments. This would include a review of parking management policy and how parking restrictions are applied and enforced in local streets (see action 14.3). Reduced car ownership could also be offset by the introduction of car share schemes (see action 20.1).***

## 7.2.4 OTHER RELEVANT CONTEXT

In May 2022, Whitehorse City Council approved the development of two Lots (Lot 4 – Residential Tower and 5 – Office Tower) and the Public Realm, as identified within the masterplan. The development of these three elements (“Stage 1”) will deliver almost 50,000sqm of commercial office space, 366 apartments and 3,350sqm of new public spaces, as well creating new walkways and roads to interconnect to the precinct’s transport, retail, and dining offerings.

The office tower (Lot 5) will also provide car parking at a notably lower rate than the statutory requirements (e.g. approximately 0.5 car spaces per 100sqm for the office development compared to the statutory rate of 2.0 car spaces per 100sqm).

The residential tower provides car parking for residents at a rate marginally below the statutory requirement (i.e. 224 car spaces compared to the statutory requirement of 264 car spaces). This reduction was considered reasonable.

The proposed parking provisions of the other residential towers follows the same model of providing less car parking spaces than required by the planning scheme with the aim of reducing personal vehicle ownership and usage and encouraging active and public forms of travel.

## 7.2.5 RECOMMENDED CAR PARKING RATES

In this context, it is considered inappropriate to provide car parking at the rates prescribed in the Parking Overlay as this would represent a disproportionate oversupply of car parking that would place further strain on an already congested road network.

Rather, it is recommended that car parking rates generally aligned with the existing Parking Overlay are adopted as maximum rates (rather than minimum rates) for the Box Hill Central North precinct only. This would entail the adoption of rates as summarised in Table 7.2.

This approach would allow Council to effectively stage the implementation of maximum car parking rates across the Box Hill MAC in a manner which generally aligns with its existing Parking Overlay for sites with particularly excellent access to public transport services (such as Box Hill Central North). Equally, the adoption of maximum rates would also allow development to occur in such areas with a parking provision that responds to market conditions which may or may not seek the provision of that parking.

**Table 7.2: Recommended Car Parking Rates for Box Hill Central North**

Land Use	Type	Statutory Maximum Rates	
		Resident/Employee	Visitor/Shopper
Residential	One-bed	1 per dwelling	0.1 per dwelling
	Two-bed	1 per dwelling	
	Three-bed	2 per dwelling	
Office	Office	2.0 spaces to each 100sqm NFA	
Retail	Shop	3.5 spaces to each 100sqm NFA	

**Note:**

*It is appreciated that adoption of these maximum rates to the development envisaged in the masterplan could result in a significantly higher quantum of car parking than 1,398 car spaces (as used for the traffic generation sanity check outlined earlier in this report). On advice from Vicinity, it is expected that the actual parking provision associated with the developments envisaged in the masterplan is likely to be closer to 1,398 car spaces shown in the architectural plans prepared by Bates Smart.*

## 7.3 RESPONSE 2 - NEW STREET NETWORK INCL. CLOSURE OF FAIRBANK LANE

As outlined earlier in this report, the masterplan proposes the creation of a new internal street network that links Prospect Street and Clisby Court, with the bookend intersections to be reconfigured as follows:

- At the Whitehorse Road interface: The street will feature a raised pedestrian threshold treatment to slow vehicle movements and prioritise the movement of pedestrians crossing along the southern side of Whitehorse Road.
- At the Nelson Road interface: The street will replace the existing roundabout with a raised t-intersection to provide pedestrian crossings on the north, east and west approaches. (The south leg will be closed to traffic as part of the masterplan). These crossings will be located closer to the intersection (than the existing crossings on the north and west approaches) to better align with pedestrian desire lines.
- Closure of Fairbank Lane: with the closure of Fairbank Lane access to 852 Whitehorse Road will now be provided via Nelson Road only.

It is expected that these bookend intersections (as well as other intersections in the vicinity of the site) will operate safely and efficiently under the ultimate development conditions given that the development as envisaged in the masterplan will result in a net traffic deintensification of the site. Further information regarding intersection performance is included in Section 7.6.

Specifically, it is noted that whilst the development is expected to generate up to approximately 239 vehicle movements in any peak hour, the existing traffic generation of the site ranges from 265 to 806 vehicle movements per hour<sup>6</sup>. For the critical PM peak hour, over 300 fewer vehicle trips are expected which are also distributed at two locations (Whitehorse Road interface and Nelson Road Interface) compared to most if not all traffic which currently funnels through Nelson Road.

It is noted that the intersection works proposed at the existing Clisby Court / Fairbank Lane / Whitehorse Road intersection will also improve its safety. Under current arrangement, Clisby Court is accessed from the beginning of the deceleration lane into Fairbank Lane where confusion could exist regarding where a left-turning vehicle may turn. Under the proposed arrangements, the removal of Fairbank Lane will simplify this intersection layout and remove a point of potential vehicle-vehicle and/or vehicle-pedestrian conflict.

## 7.4 RESPONSE 3 – SERVICE LANEWAYS

The masterplan has been designed with vehicle access provided to Lots 1, 2, 5, 6 and 7 via service laneways to minimise crossovers onto Prospect Street. This approach will assist to minimise congestion on Prospect Street whilst also improving the public realm and pedestrian safety.

## 7.5 RESPONSE 4 - OTHER WORKS ENVISAGED IN THE ITS

The Whitehorse City Council's Box Hill ITS outlines numerous actions to improve the transport systems within the Box Hill MAC. A comprehensive assessment of the ways in which the masterplan provide for, or does not preclude the items listed within the ITS is summarised in Appendix A. Specific items are reproduced listed below:

---

<sup>6</sup> Traffic surveys commissioned by Stantec (then GTA) undertaken in December 2018 recorded traffic volumes to/from the precinct as follows:

- |                                 |                                 |
|---------------------------------|---------------------------------|
| • Weekday AM Peak Hour:         | 265 vehicle movement per hour   |
| • Weekday PM Peak Hour:         | 565 vehicle movements per hour  |
| • Saturday Lunchtime Peak Hour: | 806 vehicle movements per hour. |



***“Action 3.1 – Construction new pedestrian (zebra) / raised flat top (wombat) crossing”***

Figure 13 of the ITS identifies Prospect Street / Nelson Road as a potential opportunity to provide a new at-grade zebra or raised wombat crossing. The street network proposed in the masterplan includes the provision of raised pedestrian crossings at the existing roundabout on the preferred desire lines. The works proposed in the masterplan are consistent with this recommendation.

***“Action 13.2 – Undertake Area-wide speed limit reductions”***

It is proposed that the speed limit on Prospect Street will be 40km/hr (or lower). This is consistent with the desire to implement 40km.hr speed limits for all local streets within the MAC.

***“Action 13.3 – Investigate further speed reductions to 30 km/h”***

There is potential to also decrease the speed through Prospect Street to be 30km/h. Current landscaping and urban design techniques such as pavement changes make this road suitable to be a low speed environment. The prioritisation of pedestrians through this link, together with the raised crossings at each bookend intersection, will likely act to lower speeds to this desired limit.

***“Action 13.4 – Investigate sites for improved traffic calming”***

This action is focused on the traffic calming of primary walking and cycling routes. Traffic calming measures including landscaping and pavement changes for pedestrian crossings along Prospect Street already provide a degree of traffic calming. There is potential that this could be further explored to further enhance pedestrian and cycling amenity and safety more greatly.

***“Action 19.4 – Development workplace and school travel plans”***

A ‘soft measure’ of traffic mitigation are Green Travel Plans for land uses such as workplaces as residential developments. These Plans outline for employees / residents what different transport options are available for the area with a particular focus on alternative modes to private transport. These plans will be provided with each stage of development.

***“Action 20.2 – Review car share parking requirements”***

The ITS identifies the possibility for a review of the planning permit conditions for large developments to provide dedicated on-site car share parking spaces. While currently not in place, this is an option that can be explored for future developments through the conversion of notional existing spaces to car share facilities. The masterplan does not preclude this from happening.

## **7.6 RESPONSE 5 – TRAFFIC PERFORMANCE**

In summary of the modelling scenarios considered, the development considered within this master plan is modelled to show an improvement to the function of Whitehorse Road / Nelson Road intersection.

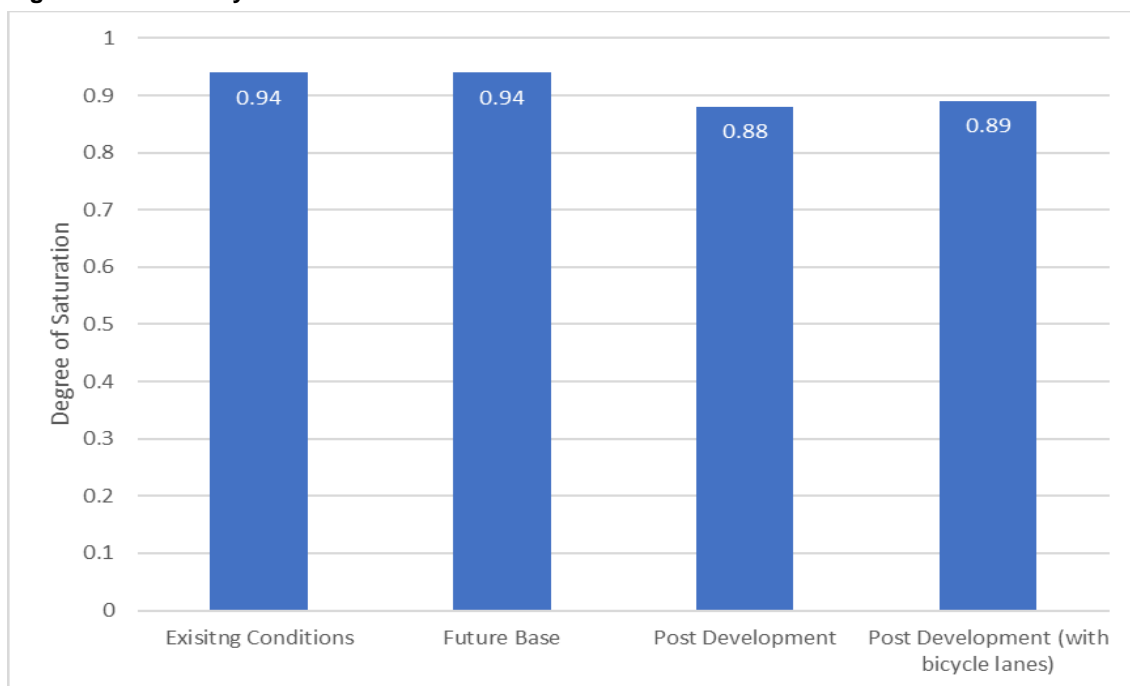
This improvement is mainly due to a traffic de-intensification associated with the development of the precinct and a redistribution through the proposed road network. The reduction of traffic volume on Nelson Road also provides opportunity to provide additional green time to Whitehorse Road or potentially reduce the overall cycle time to provide greater pedestrian crossing frequency.

A summary of the intersection performance through the modelling scenarios is contained in Figure 7.1. This shows that the Post Development scenario which considers the full build out of the masterplan provides the best intersection performance at Whitehorse Road / Nelson Road intersection. The analysis also shows that on-road cycling lanes could be provided through the intersection, if such a project is progressed by Council or DOT in the future as part of a Strategic Cycling Corridor improvement project. (This cycling project is not proposed as part of the development of the precinct).

Detailed modelling results can be found in Appendix D.



**Figure 7.1: Summary of Whitehorse Road / Nelson Road Intersection DoS in Each Scenario**



## 7.7 SUMMARY

The masterplan proposes the following traffic responses:

- The adoption of site-specific maximum car parking rates to proactively reduce traffic impacts. The recommended rates are:
  - Residential:
    - One-bedroom apartments: 1 resident car space per apartment
    - Two-bedroom apartments: 1 resident car space per apartment
    - Three-bedroom apartments: 2 resident car spaces per apartment
    - Visitors: : 0.1 visitor car spaces per apartment
  - Office: 2 car spaces per 100sqm NFA
  - Shop: 3.5 car spaces per 100sqm NLA
- The creation of a new street network through to link Prospect Street and Clisby Court, which includes road works at the Whitehorse Road / Clisby Court and Nelson Road / Prospect Street intersections to improve their safety.
- The introduction of service laneways to provide vehicle access to development lots (as far as practicable) to minimise crossovers onto Prospect Street.
- The potential to implement other measures as recommended in Whitehorse City Council's Box Hill ITS with future stages of development.

These responses can be expected to accommodate the anticipated traffic demands of the development of the site, noting that the development as envisaged in the masterplan will result in a net traffic deintensification of the site. Specifically, it is noted that whilst the development is expected to generate approximately 240 vehicle movements in any peak hour, the existing traffic generation of the site ranges between 265 and 806 vehicle movements per hour. For the critical PM peak hour, over 300 fewer vehicle trips are expected. This has been tested and confirmed through intersection modelling which shows that the development of the masterplan results in an improved intersection performance at Whitehorse Road / Nelson Road.

# 8 Conclusion

08



Based on the assessment contained in this report, the following transport responses are considered appropriate to support the development of the site as envisaged in the masterplan:

- **Walking & Cycling Responses:**

- The creation of a new street network through to link Prospect Street and Clisby Court
- The extension of Main Street to the new street network to improve pedestrian connectivity to, from and through the site for the benefit of the Box Hill MAC and surrounding destinations like Box Hill Hospital and Box Hill Institute of TAFE.
- The closure of Fairbank Lane to the immediate north of the Box Hill Central North site to provide the opportunity to provide "Fairbank Park" located adjacent Whitehorse Road and an additional park adjacent Nelson Road (while maintaining access to 852 Whitehorse Road.
- The provision of area to facilitate ability for Council to incorporate future cycle and pedestrian link over the train line along the western edge of the site.
- The provision of bicycle parking infrastructure which will exceed statutory requirements.

- **Public Transport Responses:**

- The provision of improved pedestrian connections through the site from its development and the surrounding area to the train station. (The public transport accessibility of this train station is also to be enhanced by the proposed Suburban Rail Loop project).
- The provision of car parking at rates well below statutory requirements as a proactive means to reduce traffic impacts by encouraging the use of public transport.
- The commitment to other "soft measures", such as Green Travel Plans for each development and enhanced wayfinding signage within the new public realm.

- **Traffic (& Car Parking) Responses**

- The adoption of site-specific maximum car parking rates to proactively reduce traffic impacts. The recommended rates are:
  - Residential:
    - One-bedroom apartments: 1 resident car space per apartment
    - Two-bedroom apartments: 1 resident car space per apartment
    - Three-bedroom apartments: 2 resident car spaces per apartment
    - Visitors: : 0.1 visitor car spaces per apartment
  - Office: 2 car spaces per 100sqm NFA
  - Shop: 3.5 car spaces per 100sqm NLA
- The creation of a new street network through to link Prospect Street and Clisby Court, which includes road works at the Whitehorse Road / Clisby Court and Nelson Road / Prospect Street intersections to improve their safety.
- The introduction of service laneways to provide vehicle access to development lots (as far as practicable) to minimise crossovers onto Prospect Street.
- The potential to implement other measures as recommended in Whitehorse City Council's Box Hill ITS with future stages of development.





# APPENDIX A

## BOX HILL INTEGRATED TRANSPORT STUDY SUMMARY

As per discussion with DELWP, consideration has been given the delivery of the actions outlined within the ITS as part of the proposed Masterplan, this includes with regard to the proposed masterplan staging. Details regarding the proposed staging of the masterplan can be found in Bates Smart's Masterplan Report. The proposed staging is indicatively only and is subject to change. In summary, the staging is as follows:

- Stage 1: Lots 4 and 5 and Public Realm
- Stage 2: Lot 2
- Stage 3: Lot 3
- Stage 4: Lot 1, Fairbank Park and Nelson Park
- Stage 5: Lots 6 & 7



## WALKING AND CYCLING

Action	Masterplan Alignment	Comment	Delivery Timing
<b>1.1 – Widen footpaths</b>	Included in masterplan	Main Street and Prospect Street (along the frontage of the sites) are both identified as primary walking routes in the ITS. The proposal includes upgrades to Prospect Street to provide a minimum width of 2m wide footpaths on each side. Main Street is also proposed to be upgraded to be a wide pedestrian only zone. The two areas are connected by the "public domain" area which is a fully pedestrianized zone.	Stage 1 and later stages
<b>1.2 – Improve pedestrian environment in the Box Hill Mall</b>	Included in masterplan	The proposal includes the development of an open public domain space, providing an area for people to meet and dwell and helps with the movement of people to and from key areas such as the Box Hill shopping malls. The proposal therefore meets this action. Refer to Section 5 in the report for more information.	Stage 1
<b>1.3 – Conduct a review of the existing streetscape elements</b>	Not applicable		N/A
<b>2.1 – Upgrade footpaths to improve accessibility</b>	Included in masterplan	The proposal includes wide pedestrian footpaths / shared areas along Prospect Street and Main Street. It also includes the provision of DDA lifts providing a safe and easy connection between Prospect Street and Main Street.	Stage 1 and later stages
<b>2.2 – Conduct accessibility audit of the public transport interchange</b>	Not applicable		
<b>3.1 – Construct new pedestrian (zebra) / raised flat top (wombat) crossings</b>	Included in masterplan	The proposal includes the provision of a raised flat top crossing across the Loop Road providing a connection between Main Street and the wider Box Hill North area.  The proposal includes the provision of wombat crossings at the Nelson Road / Prospect Street roundabout.	Stages 4 & 5
<b>3.2 – Construct new signalised crossings</b>	Not precluded	The crossing locations outlined in the ITS do not fall within the subject site area.  The development proposal does not preclude the recommended changes outlined in the ITS.	Potential post-development opportunity



<b>3.3 – Improve crossings at all existing signalised intersections and crossings</b>	Not precluded	The crossing / signal locations outlined in the ITS do not fall within the subject site area. The development proposal does not preclude the recommended changes outlined in the ITS which could be pursued by others at a later point (e.g., modification of signal cycle times to reduce pedestrian delays at Whitehorse Road / Nelson Road Intersection)	
<b>3.4 – Construct raised threshold intersection treatments - Deliver raised threshold treatments at all unsignalised intersections of local roads along Station Street and Whitehorse Road.</b>	Included in masterplan	The proposal includes the provision of raised threshold treatment at Whitehorse Rd and Clisby Court.	Stage 1
<b>3.5 – Investigate signalised crossing countdown timers</b>	Not precluded	The crossing / signal locations outlined in the ITS do not fall within the subject site area. The development proposal does not preclude the recommended changes outlined in the ITS.	Potential post-development opportunity
<b>3.6 – Investigate opportunities to install illuminated DDA ground tactile markings linked to traffic signals</b>	Not precluded	The crossing locations outlined in the ITS do not fall within the subject site area. The development proposal does not preclude the recommended changes outlined in the ITS.	Potential delivery by others during or after masterplan delivery
<b>4.1 – Construct physically separated paths</b>	Facilitated	Prospect Street is not a primary cycling corridor. However, sharrows are proposed along the carriageway which will provide a connection to the future cycling facilities along Nelson Road which will connect to the wider area and also the future pedestrian / cycle bridge over the railway line (when that is provided).  The proposed new road provides a low speed vehicle environment which is expected to be shared with cyclists.	Potential delivery by others during or after masterplan delivery
<b>4.2 – Construct bicycle boulevards / low stress cycling streets</b>	Facilitated	Prospect Street will serve as a low stress cycling street through landscaping and design (raised intersections) which reduces vehicle speeds.	Stage 1 and later stages
<b>4.3 – Implement Strategic Cycling Corridors in Box Hill</b>	Not applicable	This action refers to the wider Box Hill area (outside of the subject site).	N/A



<b>5.1 – Provide new walking/cycling bridge over the railway line</b>	Not precluded	<p>The development does not preclude the potential provision of this bridge. Space has been provided to the west of the Lot 6 &amp; 7 to provide a bi-direction bicycle path which would connect Nelson Road to the proposed bridge.</p> <p>Plans have been prepared which show an ultimate road layout and connection between Nelson Road and the bridge which could be implemented by others as part of the construction of the cycling bridge.</p>	Potential delivery by others during Stages 4 or later
<b>6.1 – Revitalise laneways</b>	Not Applicable	The laneways identified within the ITS are outside the scope of this masterplan. It is noted however that the masterplan does provide laneways which have been designed to meet the intentions of this action.	N/A
<b>7.1 – Provide end-of-trip facilities within key destinations</b>	Included in masterplan	The proposal includes the provision of excellent bicycle parking and EOT facilities within each development which far exceed the statutory minimum requirements.	Stage 1 and later stages
<b>7.2 – Improve public end-of-trip facility provision</b>	Included in masterplan	The masterplan is expected to achieve provision of excellent visitor bicycle parking spaces throughout the public domain space which will exceed the Statutory Requirement.	Stage 1 and later stages
<b>8.1 – Improve area-wide wayfinding</b>	Included in masterplan	It is expected that wayfinding will be developed as part of the progression of the masterplan.	Stage 1 and later stages
<b>9.1 – Make interim improvements to the bus interchange</b>	Not precluded	The proposal does not preclude such improvements to be made by others.	N/A
<b>9.2 – Provide real-time service information</b>	Not precluded	The proposal does not preclude such improvements to be made by others.	N/A



## PUBLIC TRANSPORT

Action	Masterplan Alignment	Comment	Delivery Timing
<b>9.3 – Deliver high quality end-of-trip station facilities</b>	Not precluded	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>9.4 – Relocate and upgrade Box Hill bus interchange</b>	Not precluded	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>10.1 – Increase train capacity</b>	Not precluded	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>10.2 – Restructure bus routes</b>	Not precluded	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>10.3 – Improve bus service levels</b>	Not precluded	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>11.1 – Extend the tram line</b>	Not precluded	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A



## TRAFFIC AND CAR PARKING

Action	Masterplan Alignment	Comment	Delivery Timing
<b>12.1 – Modify intersections to reduce through traffic within the MAC</b>	Facilitated	While the masterplan does not propose any significant changes to intersection, it does achieve the intent of this action to reduce through traffic within the MAC by reducing the overall traffic generation by the development site and also providing additional local job opportunities.	Stage 1 and later stages
<b>12.2 – Modify traffic signal timings to prioritise active and public transport modes</b>	Included in masterplan	The proposal reduces the overall traffic generation of the development site and introduces an alternative route for traffic coming from the east via Clisby Court which further reduced the traffic through the Whitehorse Rd / Nelson Rd intersection. These changes will help enable the increased pedestrian signal timing at this intersection.	Potential delivery by others during or after masterplan delivery
<b>12.3 – Improve traffic routes along Elgar Road and Middleborough Road</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>12.4 – Reconfigure Whitehorse Road</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.  This reconfiguration at the Whitehorse Road interface will be considered as the remaining development sites are delivered.	Later stages
<b>12.5 – Reconfigure Station Street</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>12.6 – Improve connections between Elgar Road and Box Hill Central</b>	Included in masterplan	The proposal includes the connection of Clisby Court and Prospect Street resulting in improved east-west vehicle movement, aligning well with this action.	Stage 1



Action	Masterplan Alignment	Comment	Delivery Timing
<b>13.1 – Implement 40 km/h speed limits on Whitehorse Road and Station Street</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>13.2 – Undertake area-wide speed limit reductions</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>13.3 – Investigate further speed reductions to 30 km/h</b>	Not precluded	The reduction of vehicle speeds on the new road would be supported.	Potential delivery during or after masterplan delivery
<b>13.4 – Investigate sites for improved traffic calming</b>	Included in masterplan	The proposal includes the provision of a raised pedestrian shared zone across the Loop Road, a raised threshold crossing at the Whitehorse Road / Clisby Court intersection and a raised T-intersection at Nelson Rd / Prospect Street.  In this manner, the proposal provides a traffic calmed street network.	Stage 1
<b>14.1 – Manage use of train station commuter car park</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>14.2 – Relocate Box Hill station commuter parking</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>14.3 – Review on-street parking in the MAC</b>	Not applicable	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	N/A
<b>14.4 – Relocate off-street parking to outer areas within the MAC</b>	Facilitated	The proposal aligns with this action by reducing the number of retail car parking in the MAC.	Stage 1 and later stages.
<b>14.5 – Relocate on-street long term</b>	Included in masterplan	The car parking on the new road is proposed to be allocated for short-term car parking.	All stages (as required)



Action	Masterplan Alignment	Comment	Delivery Timing
parking and convert to short term zones			
<b>14.6 – Manage motorcycle/scooter parking</b>	Included in masterplan	The proposal includes motorcycle / scooter parking within the public domain on the Loop Road.	Stage 1 and later stages
<b>14.7 – Provide electric vehicle charging points</b>	Included in masterplan	The provision of electric vehicle parking is included in the already approved development in Lots 4 and 5 and is expected to be provided in future Lots.	Stage 1 and later stages
<b>15.1 – Create parklets</b>	Included in masterplan	The masterplan proposes the introduction of two parks, Fairbank Park and Nelson Park. This exceeds the action for delivering parklets.	Stage 1 and later stages
<b>15.2 – Convert off-street vehicle spaces to community uses for temporary periods</b>	Not precluded	The proposal does not preclude the recommended action but nor is it considered applicable to the development of the site.	Potential delivery by others during or after masterplan delivery
<b>15.3 – Relocate Carrington Road taxi/rideshare facility</b>	Not applicable	N/A	N/A
<b>15.4 – Investigate temporary closures of Carrington Road to vehicles</b>	Not applicable	N/A	N/A
<b>15.5 – Investigate decking over the railway line to create new public space</b>	Not applicable	N/A	N/A
<b>16.1 – Provide area-wide parking wayfinding</b>	Not precluded	The proposal includes the provision of wayfinding around the subject site with further detail to be provided at detailed design stage.	Stage 1 and later stages





Action	Masterplan Alignment	Comment	Delivery Timing
<b>16.2 – Develop a parking wayfinding app</b>	Not applicable	N/A	N/A
<b>17.1 – Review development parking rates in planning scheme</b>	Included in masterplan	The proposal includes car parking below the current statutory requirements, aligning with this recommendation.	Stage 1 and later stages
<b>18.1 – Review loading zones</b>	Included in masterplan	The proposal includes the provision of on-site loading facilities which are to be provided for each building. There is also provision for on-street loading along Prospect Street. The above provisions will improve the efficiency of loading and therefore meets this action.	Stage 1 and later stages

## TRAVEL BEHAVIOUR

Not Applicable

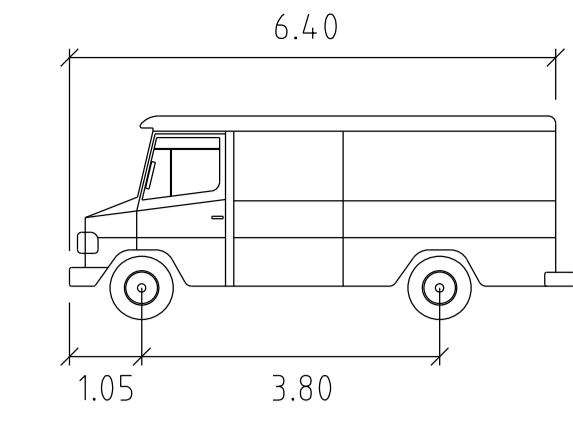
## TECHNOLOGY AND EMERGING TRENDS

Not Applicable

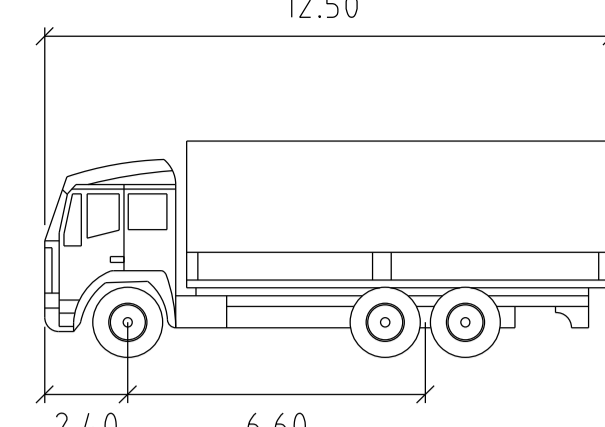


# APPENDIX B

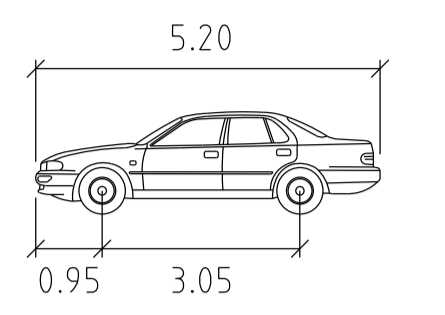
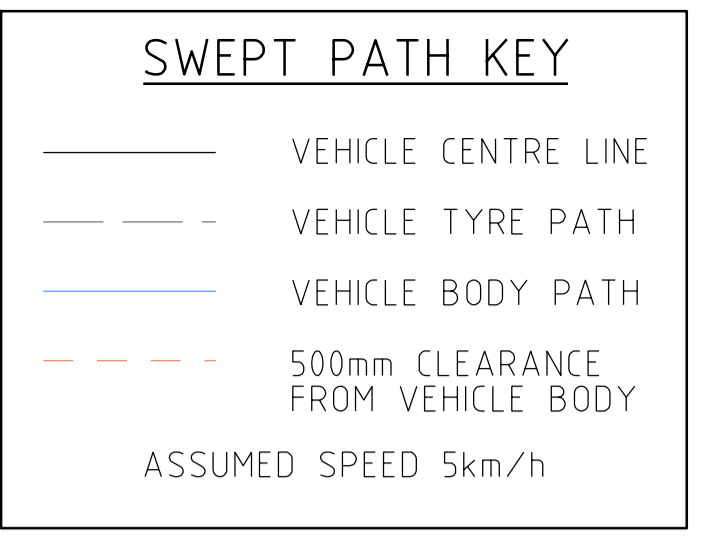
## NELSON ROAD CYCLING LANES CONCEPT DESIGN



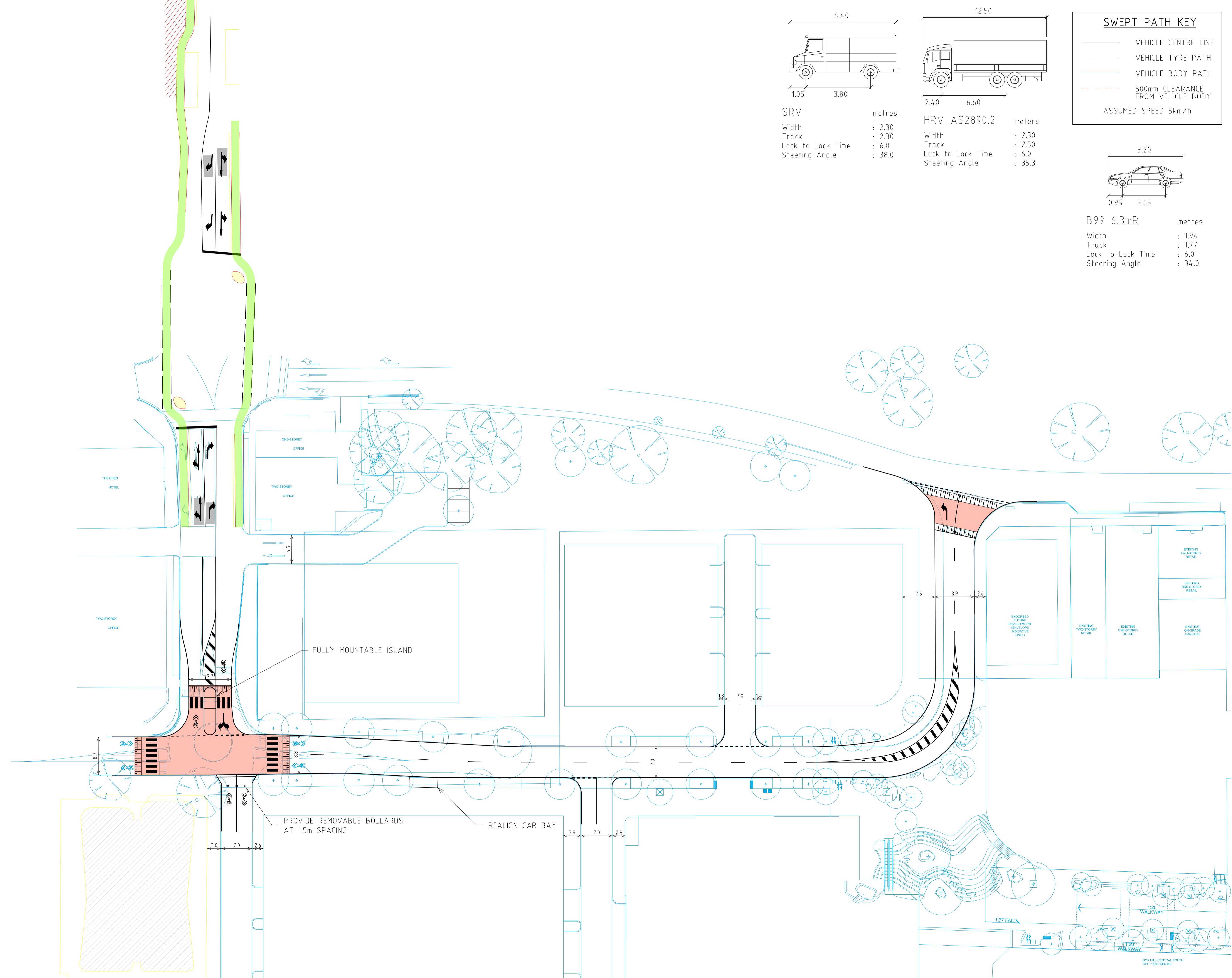
SRV  
 Width : 2.30 metres  
 Track : 2.30  
 Lock to Lock Time : 6.0  
 Steering Angle : 38.0



HRV AS2890.2  
 Width : 2.50 metres  
 Track : 2.50  
 Lock to Lock Time : 6.0  
 Steering Angle : 35.3



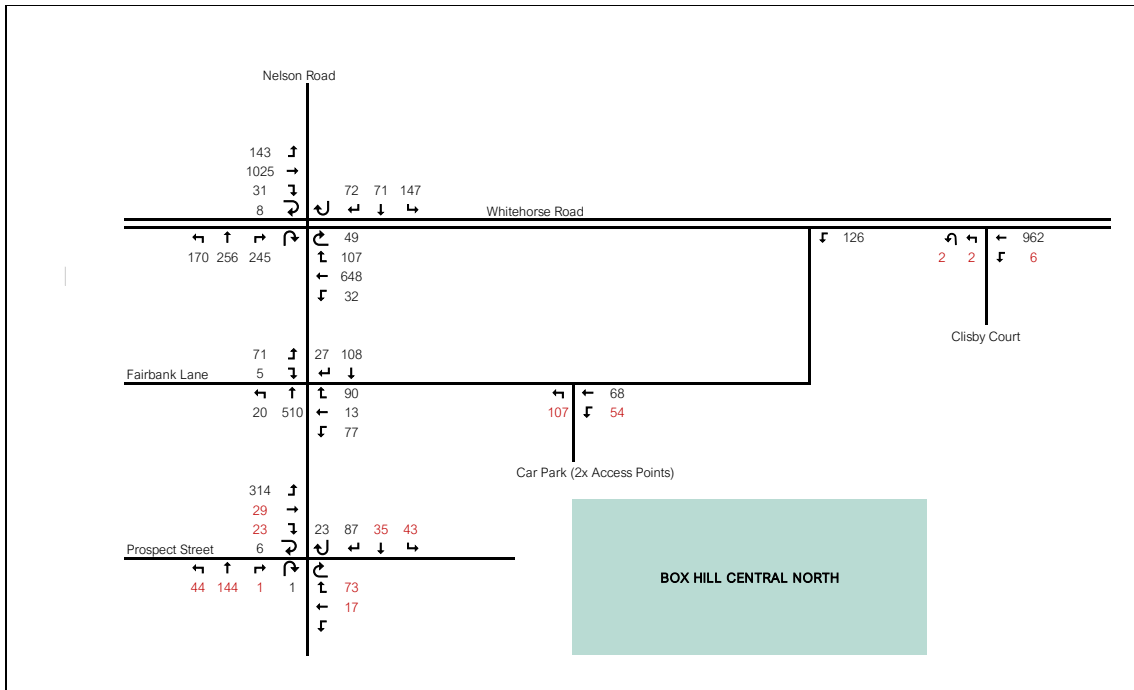
B99 6.3mR  
 Width : 1.94 metres  
 Track : 1.77  
 Lock to Lock Time : 6.0  
 Steering Angle : 34.0



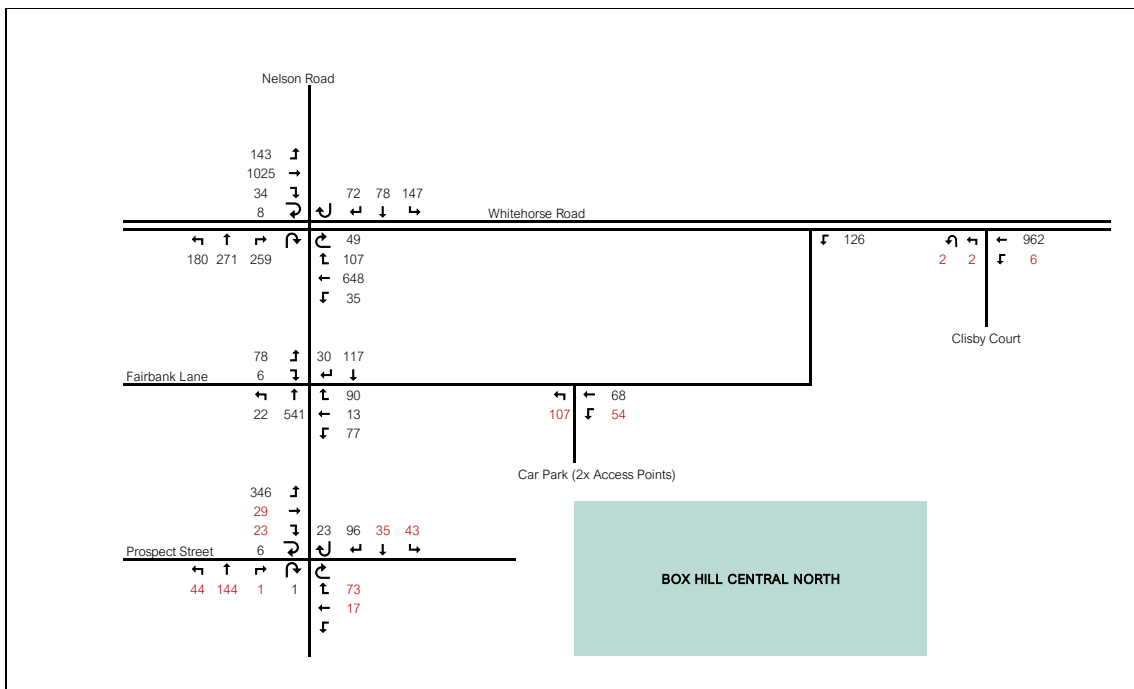
# APPENDIX C

## TRAFFIC DISTRIBUTION AND ASSIGNMENT VOLUME DIAGRAMS

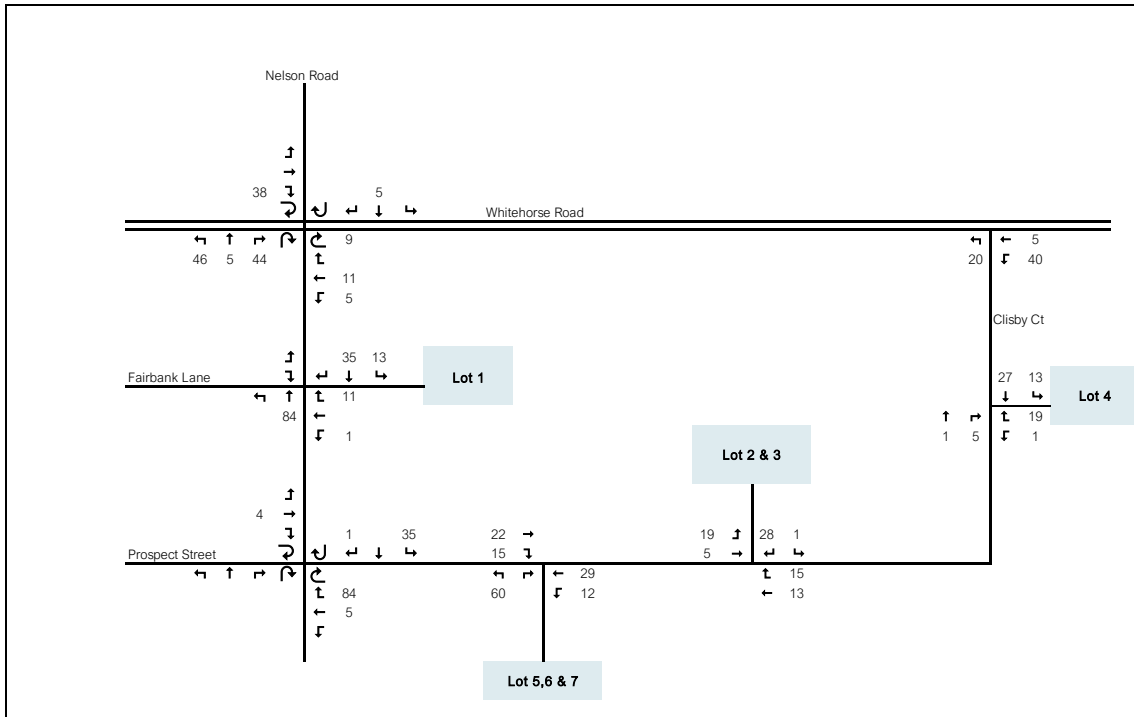
**Figure C.1: Existing Traffic Volume – PM Peak**



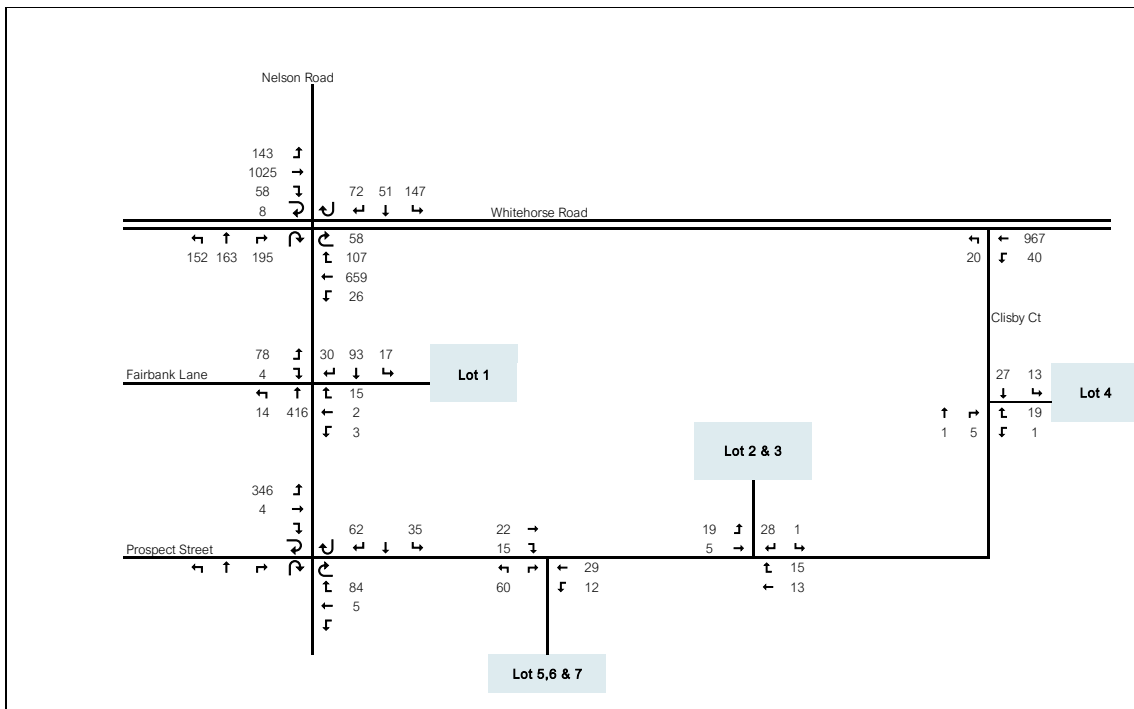
**Figure C.2: Future Base Traffic Volume – PM Peak**



**Figure C.3: Masterplan Traffic Generation – PM Peak**



**Figure C.4: Post Development Traffic Volume – PM Peak**



# APPENDIX D

## TRAFFIC MODELLING DISCUSSION AND RESULTS

## D.1. INTERSECTION MODELLING RESULTS

### D.1.1. EXISTING CONDITIONS

Observations of the road network in the vicinity of the site indicate the congestion is typically highest during the weekday PM peak hour, as site generation and passing traffic volumes are high.

In this context, the existing operation of the immediately adjacent road network during the PM peak hour has been assessed using SIDRA INTERSECTION 9, a computer-based modelling package which calculates intersection performance. This modelling has been undertaken as part of a network model that includes the following intersections:

- Whitehorse Road / Nelson Road
- Whitehorse Road / Clisby Court
- Nelson Road / Fairbank Lane
- Nelson Road / Prospect Street.

The commonly used measure of intersection performance is referred to as the *Degree of Saturation (DOS)*<sup>7</sup>. The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. For signalised intersections, a DOS of 0.95 is typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately.

As discussed in Section 2.4.2, the PM peak hour was observed to be the most critical peak hour for the surrounding road network. It is noted that on a Saturday, the traffic generation of the Centre is at its highest, however, the surrounding road network has additional capacity on weekends. In this regard, intersection modelling has been limited to the PM peak period as it represents the most critical peak hour currently.

Table D.1 **Error! Reference source not found.** presents a summary of the modelling and indicates that the Whitehorse Road / Nelson Road intersection is currently operating satisfactorily, with a degree of saturation up to 0.94. Using the Level of Service guide, this analysis suggests that the intersection operates with an "acceptable" level.

**Table D.1: Whitehorse Road / Nelson Road Modelling Summary – Existing Conditions PM Peak**

Intersection	Approach	DOS	Average Delay	Average Queue
Whitehorse Road / Nelson Road	Nelson Road (South)	0.65	32 sec	23 m
	Whitehorse Road (East)	0.94	41 sec	74 m
	Nelson Road (North)	0.40	51 sec	36 m
	Whitehorse Road (West)	0.80	39 sec	133 m

<sup>7</sup> SIDRA adopts the following criteria for Level of Service assessment:

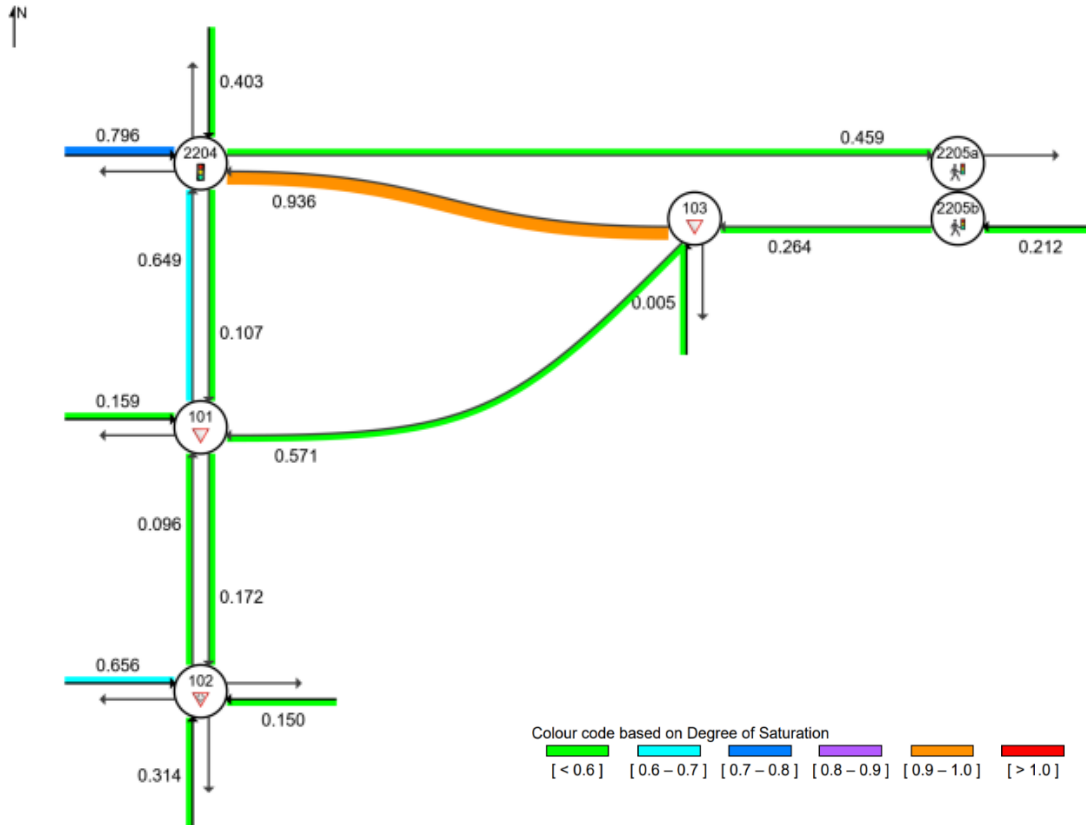
Level of Service		Intersection Degree of Saturation (DOS)		
		Unsignalised Intersection	Signalised Intersection	Roundabout
A	Excellent	<=0.60	<=0.60	<=0.60
B	Very Good	0.60-0.70	0.60-0.70	0.60-0.70
C	Good	0.70-0.80	0.70-0.90	0.70-0.85
D	Acceptable	0.80-0.90	0.90-0.95	0.85-0.95
E	Poor	0.90-1.00	0.95-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0	>=1.0



	<b>Intersection</b>	<b>0.94</b>	<b>39 sec</b>	<b>133 m</b>
--	---------------------	-------------	---------------	--------------

For reference, the existing Degree of Saturation on the broad network is also shown in Figure D.5. **Error! Reference source not found.** This figure shows that the network in the vicinity of the study area is operating at an acceptable level. During the PM peak hour, the right turn from the west approaches a DoS of 0.94, this is because of a high volume and proportion of u-turn movements at the intersection.

**Figure D.5: Modelling Results – Existing Conditions – PM Peak Hour – Degree of Saturation**



## D.1.2. FUTURE TRAFFIC PERFORMANCE

To further understand the traffic impacts of the network changes and land use changes associated with the masterplan, intersection modelling has been undertaken using SIDRA INTERSECTION 9. The modelling has considered the following scenarios:

- Future Base Conditions (existing road network plus increased traffic movements to reflect other concurrent developments by others along Prospect Street)
- Post Development (masterplan road network, removal of traffic associated with retail land uses to be removed, and addition of traffic generated by the masterplan)
- Post Development + Bicycle Lanes (post development scenario but also considering potential bicycle lanes along Nelson Road.)

A summary of the modelling approach and results is contained below, full intersection summaries are contained in this Appendix.

### D.1.3. FUTURE BASE CONDITIONS

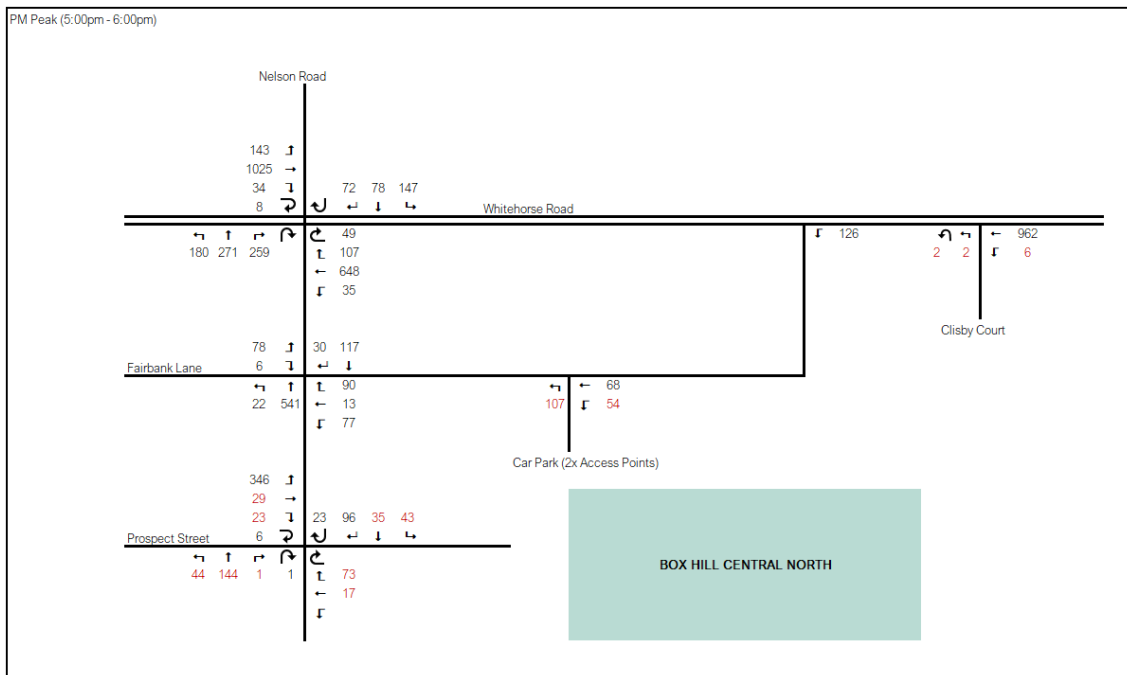
It is understood that the numerous developments are currently under construction in the Box Hill area, particularly along Prospect Street to the west of the subject site. These developments will likely increase traffic volumes during on the adjacent road network and, as it relates to this study, along Nelson Road.

The potential cumulative impact of these developments is clearly beyond the scope of this assessment, which only relates to the development of a defined masterplan in accordance with existing controls. In our experience, cumulative assessments are warranted for rezoning applications and / or particularly intense traffic generating land uses. (As outlined later in this report, the proposed development of the site will replace a high traffic generating land use (retail floor area and car parking) and thus result in a net traffic generation reduction during the PM peak hour).

Notwithstanding this, for the purposes of including an allowance for the potential traffic volume growth in the immediate vicinity of the site, all existing turning movements into and out of Prospect Street and Fairbank Lane have been factored up by 10%. This approach has been adopted to estimate the potential impact of this cumulative development.

The increased traffic as a result of this change is shown in Figure D.6 **Error! Reference source not found..**

**Figure D.6: Traffic Change – Nearby Developments – PM Peak**



The Degree of Saturation on the broader network under this future scenario is shown in Figure D.7 **Error! Reference source not found.** and the Whitehorse Road/ Nelson Road intersection summary is shown in Table D.2.

The performance of the intersections in the future base scenario is similar to the existing conditions with minor differences in traffic performance with marginal decreases of the performance of the Nelson Road southern approach at the Nelson Road / Whitehorse Road intersection and the exit from Fairbank Lane (east) onto Nelson Road.

Figure D.7: Modelling Results – Future Base – PM Peak Hour – Degree of Saturation

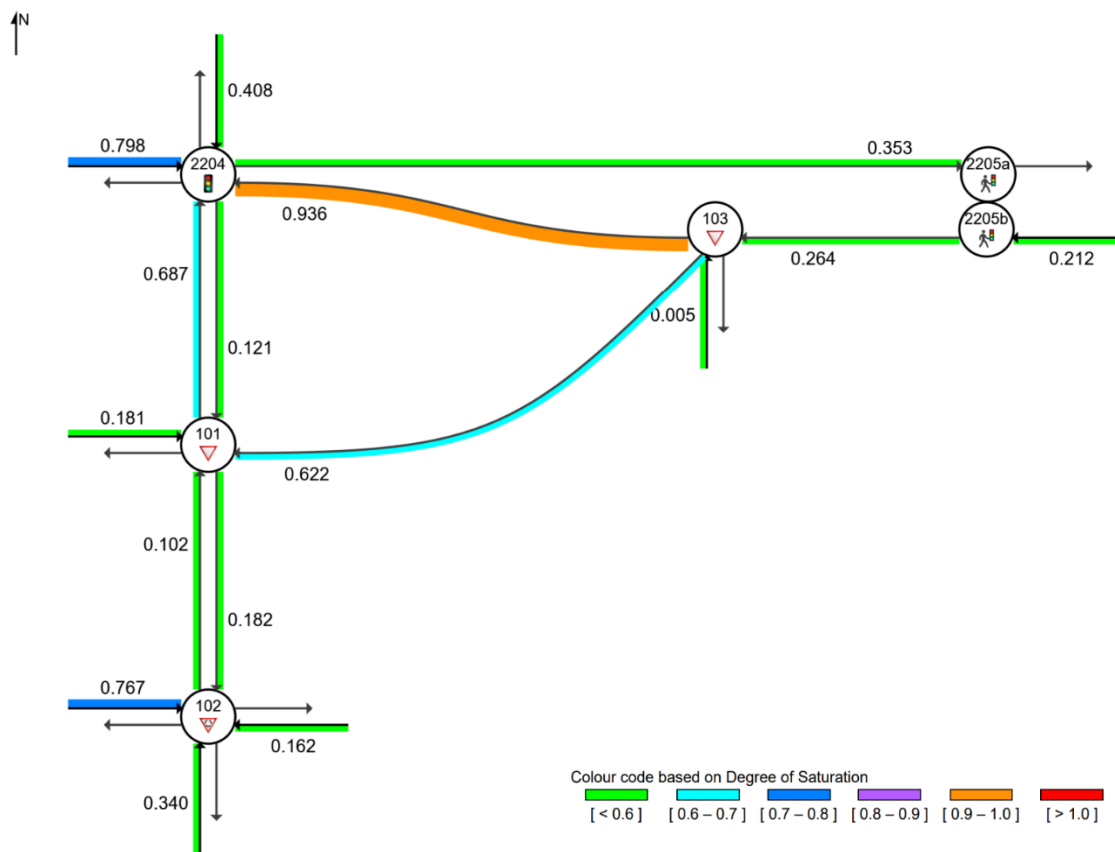


Table D.2: Whitehorse Road / Nelson Road Modelling Summary – Future Base Scenario PM Peak

Intersection	Approach	DOS	Average Delay	Average Queue
Whitehorse Road / Nelson Road	Nelson Road (South)	0.69	33 sec	23 m
	Whitehorse Road (East)	0.94	40 sec	70 m
	Nelson Road (North)	0.41	51 sec	36 m
	Whitehorse Road (West)	0.80	40 sec	133 m
	<b>Intersection</b>	<b>0.94</b>	<b>39 sec</b>	<b>133 m</b>

### D.1.4. POST DEVELOPMENT

The post development scenario aims to analyse the network performance after the current land uses have been replaced by full extent of the masterplan (including the new street network), and includes the estimated traffic growth attributed to the numerous developments along Prospect Street in the site’s vicinity.

With the changes in the road network, there is an ability for traffic redistribution from existing patterns. It has been assumed that:

- All traffic approaching from the east will enter via Clisby Court
- All traffic approaching from the south, north and west will enter via Nelson Road (except for a small percentage which will come via Elgar Road via Prospect Street)
- Traffic egressing will split either via Clisby Court or Nelson Road (except for a small percentage with will egress via Elgar Road via Prospect Street). The percentages vary for each Lot, however, there

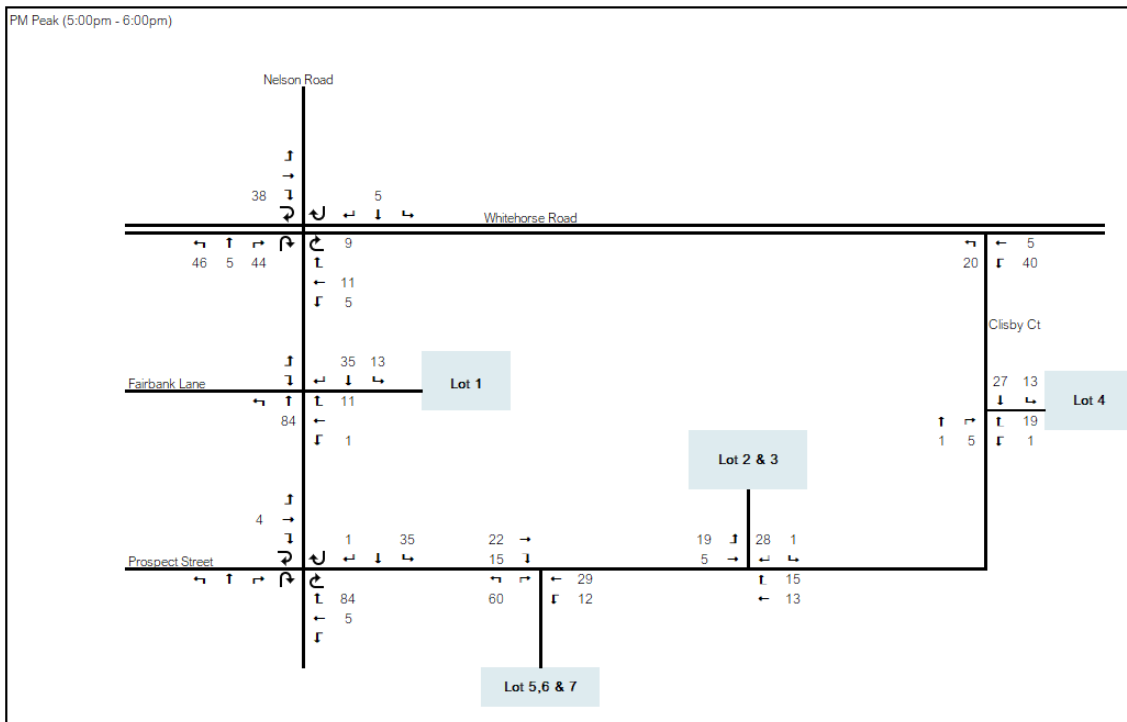
has been a heavier distribution to Nelson Road due to the ability to undertake all movements and a recognition of a required u-turn if a vehicle desiring to head east using Clisby Court.

The distribution percentages for each lot are included in Appendix C. The total traffic generation and distribution of the master plan is summarised in Table D.3 and Figure D.8, respectively.

**Table D.3: Traffic Generation by Lot – Post Development – PM Peak Hour**

Lot	Residential (veh/hr)	Commercial (veh/hr)	Retail (veh/hr)	Total (veh/hr)
1	17	3	4	25
2	23	4	4	30
3	25	3	4	33
4	24	8	6	38
5	-	41	10	51
6&7	26	7	4	37
<b>Total</b>	<b>116</b>	<b>66</b>	<b>32</b>	<b>214</b>

**Figure D.8: Traffic Distribution – Post Development – PM Peak Hour**



Based on the assumptions outlined above, the degree of saturation network diagram is provided at Figure D.9 **Error! Reference source not found.** and the Whitehorse Road/ Nelson Road intersection summary is shown in Table D.4.

It is noted that the due to the traffic reduction that is expected on Nelson Road (south) as a result of the development associated with the masterplan, the intersection phase times for the post development scenarios have been modified to allow the program to determine that optimal cycle time (existing conditions adopts phase times as observed in historical traffic signal timing data). This is to give a better representation of the function of the intersection with regard to the new traffic movements at the intersection. As a result of this change, additional time is given to the westbound movement and westbound right turn and less to Nelson Road (south).

Figure D.9: Modelling Results – Post Development – PM Peak Hour – Degree of Saturation

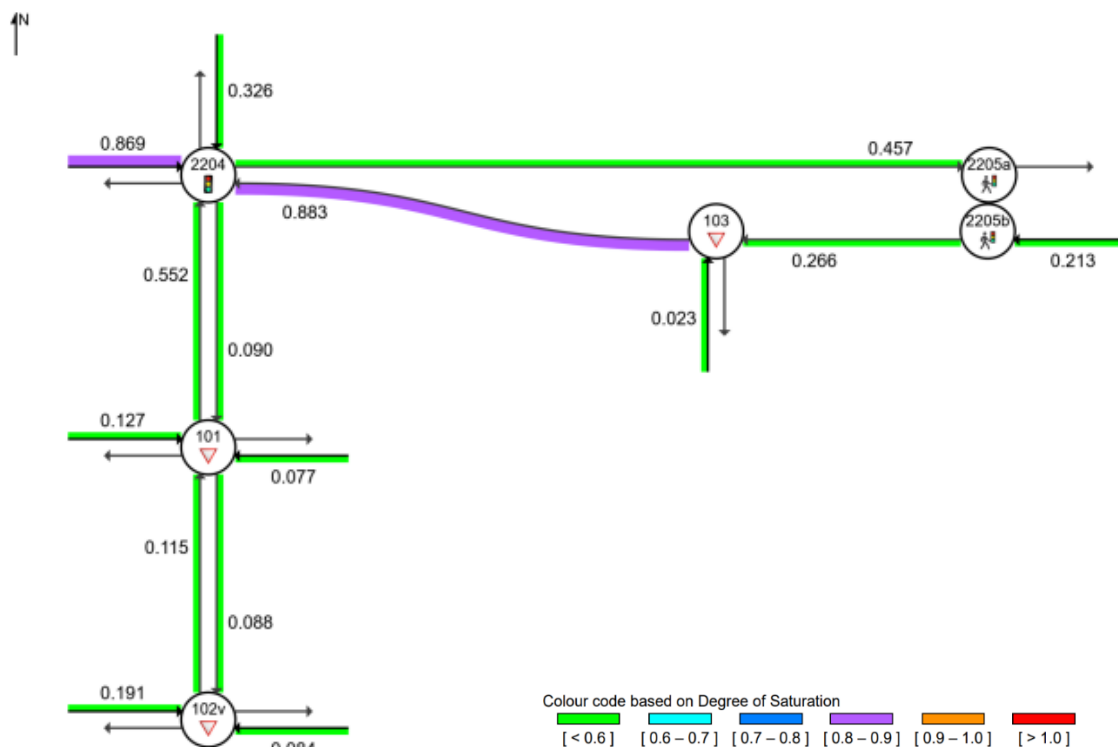


Table D.4: Whitehorse Road / Nelson Road Modelling Summary – Post Development Scenario PM Peak

Intersection	Approach	DOS	Average Delay	Average Queue
Whitehorse Road / Nelson Road	Nelson Road (South)	0.55	29 sec	31 m
	Whitehorse Road (East)	0.88	45 sec	79 m
	Nelson Road (North)	0.31	45 sec	33 m
	Whitehorse Road (West)	0.87	48 sec	149 m
	<b>Intersection</b>		<b>0.88</b>	<b>44 sec</b>

The modelling shows that the performance Whitehorse Road / Nelson Road in the post development scenario is improved from the existing conditions. The degree of saturation of the Whitehorse Road / Nelson Road intersection decreases to 0.88 in this scenario from 0.94 in the existing conditions scenario. The reasons for the improvements include:

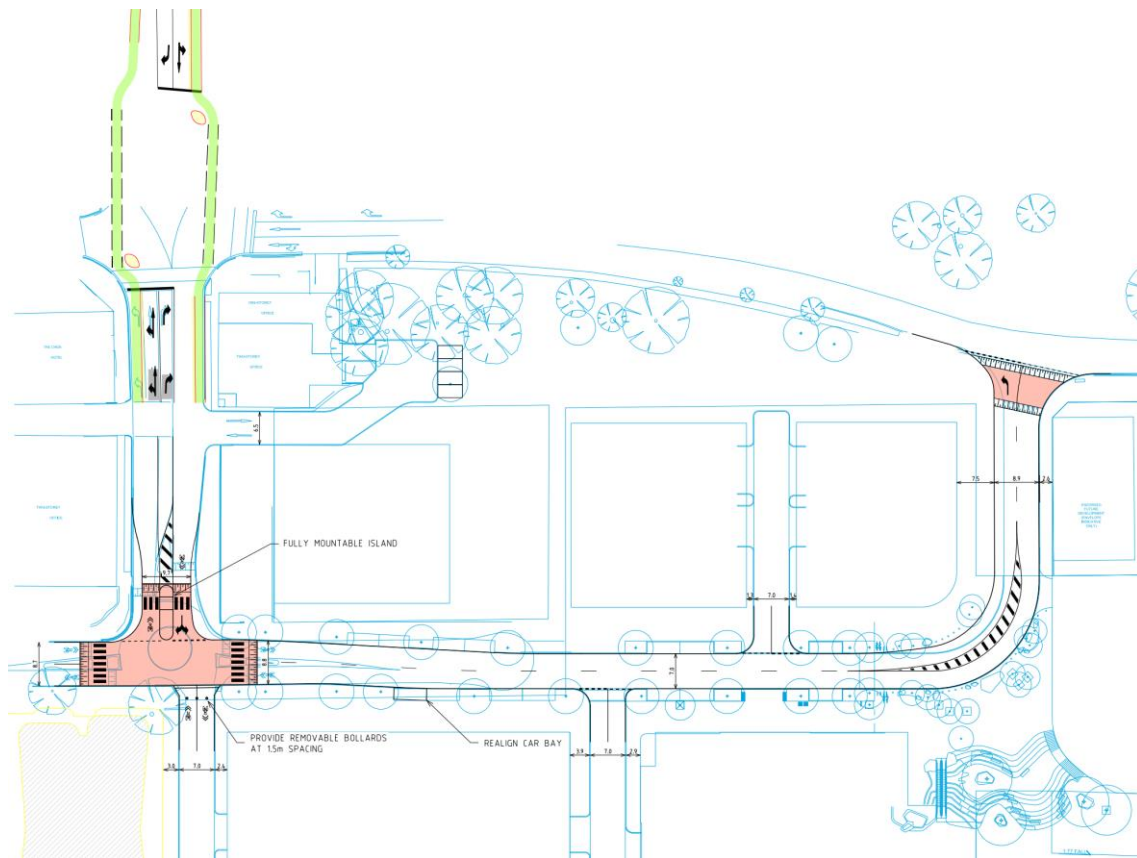
- The proposed land use in the masterplan is less car intensive than the current retail land use (less vehicle trips are being made on the network).
- The masterplan includes a new road network connecting Prospect Street and Clisby Court which provides an alternative egress point to Nelson Road (under existing conditions, all traffic must egress via Nelson Road)
- The reduction and redistribution of traffic (particularly away from Nelson Road) provides opportunity to redistribute the signal phase times and provide additional green time to Whitehorse Road while maintaining a similar level of performance on Nelson Road (with lesser green time)

### D.1.5. POST DEVELOPMENT (WITH BICYCLE LANES)

In acknowledgment of the potential bicycle connection along Nelson Road, a high-level concept design has been prepared which considers the provision of on-road bicycle facilities along Nelson Road, sharrow

treatments near Prospect Street and the future connection to the cycling bridge over the railway. Traffic modelling has considered the impacts that this proposed arrangement would have to the master plan. Figure D.10 shows the latest schematic designs.

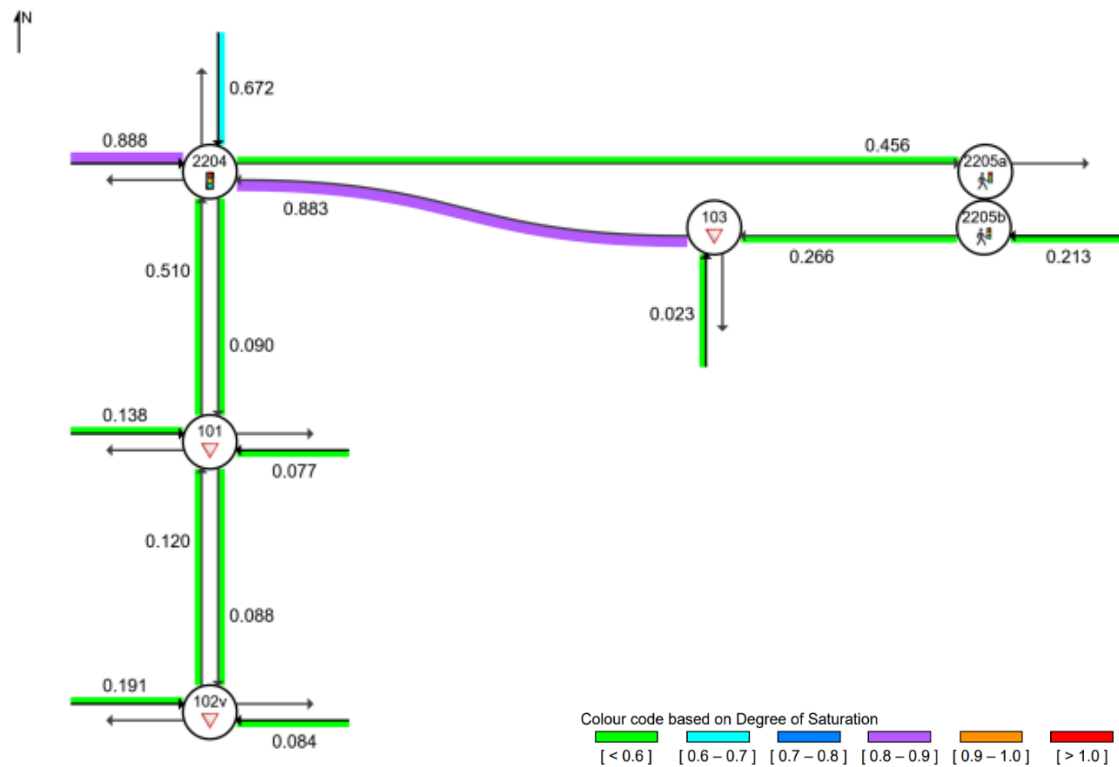
**Figure D.10: Latest Nelson Road Bike Lanes Design**



In this scenario, only changes to traffic geometries were considered which include the removal of one traffic lane in the north and south direction (bicycle lanes have not been included as cyclists are likely to operate within the current north-south pedestrian phase, thus will not have any material impact to the signal timing).

In this regard, the modelled results are shown in Figure D.11 Figure D.10 and Table D.5.

**Figure D.11: Modelling Results – Post Development (with bicycle lanes) Scenario – PM Peak Hour – Degree of Saturation**



**Table D.5: Whitehorse Road / Nelson Road Modelling Summary – Post Development (with bicycle lanes) Scenario PM Peak**

Intersection	Approach	DOS	Average Delay	Average Queue
Whitehorse Road / Nelson Road	Nelson Road (South)	0.51	36 sec	41 m
	Whitehorse Road (East)	0.88	45 sec	79 m
	Nelson Road (North)	0.67	49 sec	50 m
	Whitehorse Road (West)	0.89	52 sec	155 m
	<b>Intersection</b>		<b>0.89</b>	<b>47 sec</b>

The performance of the Whitehorse Road / Nelson Road intersection in this scenario is reduced, however, continues to operate within their capacity. Compared to the post development scenario (without bicycle lanes), this scenario:

- Increases the queue distance on Nelson Road south approach from 31m to 41m (queue extent near to Prospect Street).
- Increases the delay on Nelson Road south approach by 7 seconds (29 to 36 seconds).

It is noted that this assessment provided is high-level in nature and is meant to only inform the early-stage potential of the provision of bicycle lanes on Nelson Road and to confirm that the masterplan enables its provision through the reduction of traffic along Nelson Road and the provision of land for a future connection over the retail. It is expected that the design and feasibility of the bicycle facilities along Nelson Road is subject to further assessment and refinement which is to be delivered by others.

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